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Managing-Director, T. ORCHARD LISLE

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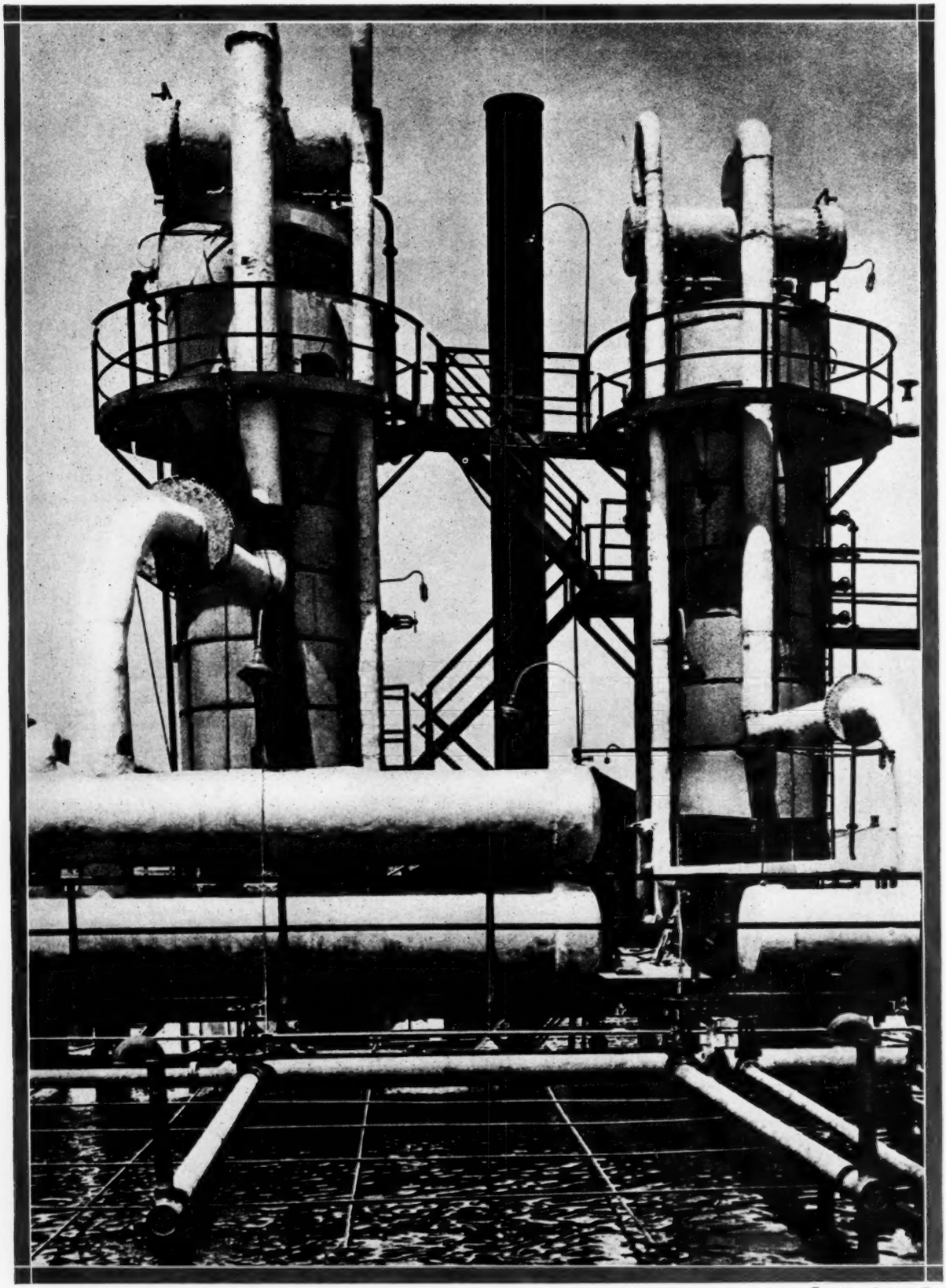

Courtesy, Amtorg Co.

Russian oil refineries under the direction of American engineers are rapidly forging ahead. ▼ ▼

NEW YORK • # WORLD PETROLEUM • LONDON

Resumption of Drilling

THAT the present drastic drilling curtailment in countries overseas will only last a few more months, and that with the gradual world-wide restrictions on oil production will come a partial revival of drilling operations, especially by independent British companies, is the belief in at least one international quarter. One hears much about over-drilling, but the real trouble rests—not in the amount of drilling, but how the drilling is carried out and over-production after the holes are made. Too many wells on small areas by independent companies and individuals in the United States with the consequent mad rush to drain the oil first without thought of the future has brought about the present unhealthy situation. There cannot be too much drilling, provided it is orderly and provided "excess" wells are capped until needed. For the world-wide search for new fields and their boundaries must go on without cessation. It is only the powerful, well-financed companies who can carry on this class of drilling. Ironically, in times like the present the bigger companies conserve their huge reserve funds to meet sales competition, and cut down on their searches for new fields until more favorable conditions return.

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Higher Tanker Speeds

IS A radical change in tanker speed for trans-ocean carrying of petroleum on the near horizon? Is a higher speed than that which has been standard for so many years justified by present day conditions, which every few years bring about a tankship shortage? These questions are raised by the recent ordering by European and Japanese companies of 14 knot tankers. While it is the objective of every transportation department to move oil as fast as is economically practical, jumping the speed from 11 and 11½ knots to 14 and more knots increases the first cost of both hull and machinery, as the hull lines have to be fined, the machinery costs more, weighs more, burns more fuel, and needs more engineroom and bunker space, which in turn means a bigger hull to carry the same amount of oil cargo. A slightly larger crew is necessary, operating costs and insurance are both higher. On the other hand the gain is about six days time-saving on a 7000 mile round voyage. The deciding factors are—does the result and increased annual carrying capacity warrant the higher initial outlay and operating charges under conditions likely to prevail over a 10 to 15 year period; does increased speed and reduced time mean cheaper transportation?

Benefit of Diesel Power

ONE factor in making higher tanker speeds economically possible is the Diesel oil engine with its low fuel consumption, although high-pressure superheated steam has made great advances in the last few years as a result of the severe competition given to it by the oil engine. As a tanker carries petroleum as cargo, and is always loaded to the maximum allowed, the less fuel burned on a voyage, the more money-earning oil will be delivered at the destination. In the case of hp.sh. steam machinery having a fuel consumption of 0.75 lb. per s.hp. hour, the fuel required by a 15,000 ton, 4200 s.hp. tanker for a round trip of 7000 miles at 11½ knots is about 855 tons at sea, whereas a motorship of the same capacity and speed will burn approximately 515 tons. Under average conditions the capacity of the motorship, based on one-way cargoes, is from 5 to 6 per cent greater. But by increasing the speed to 14-14½ knots the power of either type of vessel must be nearly doubled. This means increasing the consumption to 1030 and 1710 tons, respectively. It is noteworthy, however, that the fuel consumption of the Diesel tanker at 14 knots will still be less than that of an existing steamer of 11½ knots that does not have hp.sh. steam.

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International Trade

"OUR future prosperity will largely depend upon our export business. Make no mistake about that. Regardless of what Congress says and does we cannot live to ourselves alone and expect to live well." This is sound common sense from COLLIER'S August 2nd issue. It applies particularly to all commercial nations engaged in the petroleum industry and in the production of its equipment. Many manufacturing firms who after several years of excellent export business have recently made economies, place their export policy on the same plane as their domestic business. Some of them are withdrawing their representatives from overseas and cutting down on advertising, thus losing valuable direct contacts that may have taken years to build. Over-cautious executives do these things with one eye on the directors and stockholders and the other eye on the current balance sheet, feeling that they can cross back over the bridge when they arrive at the point of greater activity, on the basis that hand-to-mouth methods afford better control than does the long pull. Wise executives, understanding that the task of regaining lost contacts is expensive, look ahead and maintain international sales contacts and publicity.

Unification, and International Oil Trade

Position of American Companies in Domestic and World-wide Oil Business Greatly Strengthened by Recent Mergers. Today's Conditions Unfavorable to Specialization

A MARKED tendency on the part of the more aggressive oil companies to expand into integrated units, and to extend marketing facilities, is an important change in the industry that is now going on with renewed energy. Economic changes which have been crystallizing over a period of years have now made it necessary for oil companies, not only in this country but abroad, to work as rapidly as possible toward becoming complete units with crude oil outputs and transportation systems commensurate with refining capacities and market outlets.

Competition has been gradually increasing with the result that today very few other industries are experiencing as severe a struggle for position as now exists in the oil industry. This keen competition demands that a company obtain as large a percentage of profits as possible from every branch of the industry. This, it is asserted, is the main reason for the various mergers that have taken place during the last few years, and others that are now either in process of consummation or under contemplation.

Growth of Market

The remarkable growth in the sale of gasoline and other petroleum products in nearly every country during the past few years, due principally to the increasing use of the automobile, and to the enormous supplies of crude oil available to make these products, has resulted in a general scramble for market outlets. In order to make these market outlets profitable, rigid economy must be practised. And, in order to compete successfully for these markets, a company must receive as nearly as possible 100 per cent of the profit from every stage of operation from the production of crude oil to the sale of the finished product to the ultimate consumer.

Advantage of Integration

The Royal-Dutch Shell group is perhaps the best illustration of a well integrated unit. It has a marketing organization in practically every country with the exception of Russia. In addition to having extensive crude oil resources in several of the cheap producing areas scattered throughout the world, the group has its refining facilities strategically located and a transportation system adequate to gather its crude supplies and distribute its finished products. The group now further plans to increase its efficiency by making use of some of its by-products for fertilizers and chemicals. Recently, it completed a plant in Holland for the manufacture of fertilizers. The success of this plant has resulted in the group deciding to build a similar one in California to make fertilizers and chemicals from natural gas.

The trend of the industry toward consolidations and expanding market outlets is not for the purpose of creating a monopoly, since this would not be possible under existing conditions. There is a general feeling, however, that there will be fewer important oil units within the next few years. For instance, in the United States, which has by far the largest number of oil companies of any country, there may not be more than a dozen, but these will be not only nation-wide in their operations but world-wide. Outside of the United States, there probably will not be more than three: the Royal-Dutch Shell, the Anglo-Persian Oil Company, Ltd., and the Soviet Government which controls the oil resources of Russia.

Prospects for Smaller Companies

This trend of the industry does not mean that all the smaller oil companies, especially in the marketing branch of the industry, are going to be absorbed or go out of business. There always will be a large number of these organizations for they usually can operate very economically. The middle group of companies, however, those that have developed a good volume of business in one or more branches of the industry but are weak in other divisions, probably will have to enlarge into integrated units through expansion or consolidation or eventually go out of business.

Under certain conditions a company can make money by specializing in one branch of the industry. Prices of raw materials and the finished products, transportation methods or other factors in the situation, may change to such an extent that this company may have to operate at a loss, perhaps for a period of years, and eventually dissolve. A company specializing in one branch of industry might lose its markets almost entirely, as did the old Galena Signal Oil Company of Pennsylvania, a former Standard Oil Unit, specializing in railroad oils and lubricants. At one time this company had practically a monopoly on this class of business, but with the growth of other companies which could profitably undersell it, its business was almost entirely lost with the result that it finally had to sell a substantial part of its properties and enter another branch of the industry.

A large company operating in all branches of the industry, and on a nation-wide or world-wide basis, might lose money in one branch of the industry for a period of years and still continue making a good profit. An integrated company, therefore, with an extensive marketing organization, would not be materially penalized by any unsettlement in one or more branches of the industry or by a loss of business in one section of the United States or a single country. The profits of an integrated company are obtained from the finished goods rather than from any single operation.

Standard Oil Changes

The best illustration of the tendency in the oil industry is the changes that have taken place in the Standard Oil units of this country since the dissolution decree in 1911. At the time of the dissolution these companies, with the possible exception of Standard Oil of California, were mainly refining and marketing units with certain territories in which they could market their products.

There was also a strong community of interest between the Standard Oil units since ownership was practically the same. Gradually, a change of ownership came about, owing to various factors, including the deaths of practically all the original Rockefeller partners and the popularity of these securities for investment purposes. Fundamental conditions also changed with the result that a number of these com-

panies in various ways have expanded into integrated units. Consequently, they are now independent of each other both in ownership and operation.

Of the old Standard Oil group, the Standard Oil Company of New Jersey was the first to develop into an integrated unit, followed recently by the Standard Oil Company of Indiana. The Standard Oil Company of New Jersey only recently absorbed the Anglo-American Oil Co. The Standard Oil Company of New York for the past few years has been expanding its operations, but it is not considered yet as being a completely integrated unit. In an attempt to further expand into a world-wide and nation-wide organization, the New York company recently negotiated a consolidation agreement with the Vacuum Oil Company, another Standard Oil Unit. The legality of the merger has been challenged by the Federal Government on the ground that it would be in violation of the dissolution decree of 1911. Testimony in this case was recently completed and the arguments of counsel will be held before a Federal Court early in October.

A Very Important Expansion

One of the most significant expansions recently made is that of the Standard Oil Company of Indiana, and indications are that within a few years this concern will expand its national and international production, refining and marketing facilities to a point where it will be fully as powerful as the Royal-Dutch Shell group. A strategic move was the acquisition of the Pan-American Petroleum & Transport Company, and its subsidiary and affiliated companies, of which there are twenty-six in Mexico, Great Britain, Germany, Brazil, Maryland, Canada, Maine, Delaware, Georgia, California, and Louisiana. It includes the Lago Oil & Transport Company with enormous crude resources and production in Venezuela, and a hundred-thousand bbl. refinery at Aruba with its servicing fleet of twenty-two small tankers. The capacity of the Pan-American ocean tanker fleet, which now is added to the Indiana company's transportation facilities, can be realized when it is mentioned that last year the fleet moved 47,000,000 bbl. of oil and petroleum products. World-wide activity of tremendous extent may be looked for from the Standard Oil Company of Indiana.

Great Pipe Line Transaction

The Sinclair Consolidated Oil Corporation has an ambitious consolidation and expansion program under way. The first step in its plan has practically been concluded, the sale of its one-half interest in the Sinclair Crude Oil Purchasing Company and the Sinclair Pipe Line Company to the Standard Oil Company of Indiana for $72,500,000 in cash. The next step in Sinclair's program is understood to be the acquisition of the assets of the Prairie Pipe Line Company, The Prairie Oil Gas Company—two Standard Oil units—and the Tide Water Associated Oil Company. Through these three acquisitions, the Sinclair Company will become a nation-wide organization controlling its own crude oil supplies, with a transportation system adequate to supply its refineries with raw materials and with marketing outlets commensurate with its refining capacity.

Owing to changes in the crude producing branch of the industry during the last few years, it is almost compulsory that the Prairie Oil & Gas Company unite with some company with large refining and marketing facilities. For a number of years several of the Standard Oil units were more or less dependent upon Prairie for their crude oil supplies, including the Standard Oil Company of New Jersey. However, as these companies obtained crude oil supplies of their own, Prairie had to look for other customers for its crude oil. As a result of over-production of crude oil during the last few years, the price of this commodity has declined. This, coupled with the loss of some of its markets, has made it necessary for Prairie to consolidate with an important refining and marketing organization or to operate at a decided disadvantage.

Dutch-British Have a Free Hand

The Texas Corporation during the past few years has expanded into a nation-wide organization, and has marketing operations abroad. The Shell Union Oil Corporation, approximately 70 per cent of whose common stock is owned by the Royal Dutch-Shell group, is the only other oil company operating nationally. Although some of the Standard Oil units have been handicapped in their expansion policies owing to the dissolution decree, the Shell Union Oil Corporation has had practically a free hand in its expansion program. The aggressiveness of Shell Union has caused considerable concern among several American oil companies, especially since it has, through its connection with the Royal Dutch-Shell, cheap sources of crude oil to draw from, particularly in Venezuela, and low cost refined products available from Curacao, Aruba and Trinidad in the Caribbean.

Alcohol as Fuel in Brazil

It is only natural that countries with little or no natural petroleum resources should turn to substitutes for gasoline. Up to the present time nothing has been produced sufficiently satisfactory or on a great enough scale to form a serious competitor. Nevertheless, encouraging progress has recently been made in Brazil with "Azulina," consisting of alcohol from sugar and 5% ether denatured with 1% of methyline blue.

As there are less than 200,000 motor vehicles in Brazil, and as the possibilities for sugar production are enormous, it is easy to understand that sufficient alcohol can be produced to meet present needs if plants of sufficient capacity are constructed.

For two months the Federal Central Railroad of Brazil has been carrying on tests with two railcars, each equipped with twin 100 h.p. gasoline engines, over a distance of 500 kilometers between Sao Paulo and Rio de Janeiro. Two of these cars coupled together haul a train of 6 cars, carrying from 320 to 385 passengers, and the fuel costs are 30 per cent lower than when using gasoline. Owing to the imperfect methods in the manufacture of the ether in which traces of sulphuric acid were still noticeable the motors were somewhat affected by the new fuel, but only to a slight extent. It is expected that this difficulty will be easily overcome.

The distance between Rio and Sao Paulo, including heavy mountain grades, was covered in 11 hours and 44 minutes of which 4 hours and 5 minutes was consumed in stops, an average running speed of 68.4 miles per hour. This speed seems very high for a railcar train. The heaviest mountain grade, having a rise of 28 kms. 416 m. was negotiated in third gear. The return trip to Sao Paulo was made in still better time, 9 hours and 51 minutes. The average consumption of fuel was 1.4 liters of Azulina per kilometer. Parallel tests had shown previously that the gasoline consumption was one liter per kilometer. The selling price of Azulina is 500 milreis per 1000 liters, or exactly half the price of gasoline.

World Oil Production · June 1930

IN OUR July issue we were able to give official June oil production figures from nine countries. This has never been done before by any journal. This issue we are enabled to add several more official figures for June, but authentic returns are still missing from the Netherlands East Indies (although Sarawak figures are to hand), Persia, Argentina, British India, and Egypt. The estimates quoted, however, will be found reasonably close. As the result of curtailment steps the most substantial drop in output is shown by the United States, where the greatest decline took place in Oklahoma, where every major producing area reported a decrease except Seminole. New Mexico showed a big increase, producing 773,000 bbl., compared with 86,000 bbl. in June a year ago.

Venezuelan production was very slightly higher than the output in the previous month, possibly due to the slowly growing number of wells in the Colon district, the new pipeline from which field went into operation last February. Trinidad evidently is watching the United States, whence much of her refined products are going, as her output is slightly lower, and the only logical reason for the drop is the law of demand, as she could easily show a steady gain were the tendency not toward deliberate curtailments.

		JUNE, 1930	JUNE, 1930
United States	official	*76,513,000 bbl.	10,930,428 tons m.
Venezuela	official	11,648,847 bbl.	*1,664,121 tons m.
Russia	official	10,400,600 bbl.	*1,485,655 tons m.
Rumania	official	3,640,000 bbl.	*520,000 tons m.
Neth. E. Indies & Sarawak[1]	estimate	3,500,000 bbl.	*500,000 tons m.
Persia	estimate	3,500,000 bbl.	500,000 tons m.
Mexico	official	*3,287,054 bbl.	469,579 tons m.
Colombia	private	1,695,840 bbl.	242,263 tons m.
Peru	official	*1,055,380 bbl.	150,768 tons m.
Trinidad	official	*766,067 bbl.	109,438 tons m.
Argentina	estimate	832,650 bbl.	118,950 tons m.
India—British	estimate	600,000 bbl.	84,357 tons m.
Poland	official	373,100 bbl.	*53,300 tons m.
Japan and Taiwan	estimate	170,000 bbl.	*24,286 tons m.
Egypt	estimate	144,590 bbl.	20,370 tons m.
Ecuador	official	*129,762 bbl.	18,537 tons m.
Sakhalin	estimate	110,000 bbl.	15,628 tons m.
Canada	private	*111,960 bbl.	15,851 tons m.
Others†	estimate	170,000 bbl.	24,285 tons m.

†Germany, Iraq, France, Czecho-Slovakia, etc.
*Measure used in official returns; conversions uniformly at 7 barrels per ton.
[1]Sarawak separately about 54,121 tons m. (378,847 bbl.)

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World Oil Production · May 1930

BOTH Russia and Rumania recorded still further advances in the month of May. The Soviet increase was about 90,000 tons (about 630,000 bbl.). This in itself is not an important amount. Its significance lies in its addition to repeated monthly increases. Since the beginning of this year the Russian monthly production has been augmented over 250,000 tons (about 1,750,000 bbl.), and the monthly increase is mounting steadily. About 30 per cent is manufactured into exports.

Rumania has seemingly climbed into fourth place among the producing countries of the world, displacing the Netherlands East Indies and Sarawak combined. The Rumanian figure is official, but the production of the East Indian islands is estimated on the basis of the February official figure—the last available. Rumania's production has been increasing steadily since the beginning of the year.

Mexico, by contrast, exhibits a further decline, its monthly production now being 50,000 tons (350,000 bbl.) below the January rate. It has fallen into seventh position, whereas it occupied fourth position at the end of last year.

		MAY, 1930	MAY, 1930
United States	A. P. I.	*80,529,600 bbl.	11,504,229 tons m.
Venezuela	official	11,641,966 bbl.	*1,663,138 tons m.
Russia	official	10,851,400 bbl.	*1,550,200 tons m.
Rumania	official	3,710,000 bbl.	*530,000 tons m.
Neth. E. Indies & Sarawak[1]	estimate	3,691,800 bbl.	*527,400 tons m.
Persia	estimate	3,608,710 bbl.	515,530 tons m.
Mexico	official	*3,350,935 bbl.	478,705 tons m.
Colombia	private	1,719,138 bbl.	245,591 tons m.
Peru	official	*1,124,720 bbl.	160,103 tons m.
Trinidad	official	*779,257 bbl.	111,322 tons m.
Argentina	estimate	749,070 bbl.	107,010 tons m.
India—British	estimate	619,500 bbl.	88,500 tons m.
Poland	official	382,200 bbl.	*54,600 tons m.
Japan and Taiwan	estimate	174,300 bbl.	*24,900 tons m.
Egypt[2]	private	157,486 bbl.	22,498 tons m.
Ecuador	official	*137,928 bbl.	19,704 tons m.
Sakhalin	estimate	108,500 bbl.	15,500 tons m.
Canada	estimate	*110,000 bbl.	15,714 tons m.
Others†	estimate	175,000 bbl.	25,000 tons m.

†Germany, Iraq, France, Czecho-Slovakia, etc.
*Measure used in official returns; conversions uniformly at 7 barrels per ton.
[1]Sarawak separately about 59,750 tons m. (418,250 bbl.) [2]Anglo-Egyptian Oilfields, Ltd.

Venezuelan production was up slightly in May, compared with April. The fluctuations are considerable each month, registering variations over a range of about 200,000 tons (say 1,500,000 bbl.). The monthly Venezuelan production for the last three years is given on page 239 of this issue in a detailed official table.

FINANCE

New York . August

DURING the three weeks covered by this month's tabulation stock market activity has been characterized by dullness and irregularity with no sustained trend in evidence. Oil shares have been no exception as witnessed by the narrow ranges and small net changes shown in the table. Most of the half year reports coming to hand reveal earnings declines compared with a year ago, but this has been generally expected because of somewhat lower prices and has been already discounted in current market levels. On the other hand the progress being made in controlling production and reducing stocks has not been sufficient to form a basis for a definite upward movement in security prices.

FURTHERANCE of merger plans of Sinclair Consolidated is discernible in the recent contract of sale of this company's half interests in Sinclair Pipe Line and Sinclair Crude Oil Purchasing to Standard Oil of Indiana, which already owns the other half interests. The cash consideration involved of $72,500,000 marks the deal as one of the largest, if not the largest, cash transaction in the history of the industry.

DUE TO a very strong financial position, which included at the close of last year $122,692,246 in cash, government securities and miscellaneous investments, the Indiana company will be able to pay this large sum without recourse to outside financing.

IT IS expected that following approval of the transaction by Sinclair stockholders announcement will be made of merger agreements involving Sinclair, Prairie Oil & Gas and Prairie Pipe Line. Later inclusion of Tide Water Associated in the Sinclair system, which is now strongly rumored, would result in a second billion dollar oil unit in the country (the other being Standard Oil Company (New Jersey), with total depreciated and depleted assets of $1,027,168,000.

STOCKHOLDERS meetings of Pan American Petroleum & Transport, and Lago Oil & Transport companies, will be held August 18 to approve the agreement to merge the two companies which has been entered into by the directors. Since over 95 per cent of the Pan American voting power is concentrated in the hands of Standard of Indiana, and about 97 per cent of Lago is held by Pan American, the voting will be a mere formality and completion of the merger seems assured. Minority holders of Lago will receive one-half share of Pan American class B common for each Lago share held, and will receive non-voting, non-dividend bearing scrip for any fractional interest. Standard of Indiana's exchange offer for Pan American common shares is still open on the basis of seven shares of Indiana for each six of Pan American.

CONSOLIDATED net income of Sun Oil Company for the half year ended June 30, 1930, amounted to $3,658,157 in comparison with $3,637,540 for the same period of 1929. On the outstanding capitalization of the respective periods the common earned $2.42 this year against $2.68 last, the decline being due to the larger number of both preferred and common shares now outstanding.

PRELIMINARY report of Atlantic Refining for the first half of 1930 shows net, after charges of $2,819,000, equal to $1.05 a share, in comparison with net for the first half of 1929 of $8,862,409, equal to $3.67 a share on a somewhat smaller number of shares. Competition and lower prices have apparently taken heavy toll, and current earnings are hardly providing adequate coverage for the $2 annual dividend rate (including extras).

HALF YEAR earnings of Barnsdall also reveal the effects of lower prices, with net amounting to $3,367,440, or $1.49 per share of combined class A and class B common, in comparison with $4,115,253 or $1.83 a share for the first six months of 1929.

TOGETHER with Continental Oil, Barnsdall has formed the Great Lakes Pipe Line Company to build a $12,000,000

New York Stock Prices

1930 High	1930 Low	Current Div. $ per Annum	Stock (Par Value $)	Sales (Shares)	July 14—August 2 First	High	Low	Last	Change[1]
51⅜	30¼	†2.00	Atlantic Refining (25)	100,000	36	39⅜	35⅛	37⅛	+ ⅝
34	20½	2.00	Barnsdall, A (25)	45,600	23⅜	25½	22⅞	23¼	+ ⅜
8¼	3½	.....	Colon Oil (No)	1,300	3⅝	3⅞	3⅝	3⅞	+ ¼
30½	18⅜	.....	Continental Oil (No)	103,400	20⅜	23⅛	20⅛	20¾	+ ⅝
7⅝	5½	.....	Creole Petroleum (No)	19,700	6	6⅞	5⅞	6⅛	+ ⅛
166⅞	117½	1.50	Gulf Oil Corp. (25)	10,100	127⅞	131⅝	123	124⅝	−1⅞
119	78	2.00	Humble Oil & Ref. (25)	8,500	91⅝	93¾	88½	88⅝	−2⅞
30	18⅛	0.50	Imperial Oil, Ltd. (No)	7,900	20½	20⅞	19⅞	20⅛	− ⅛
28⅜	8¾	.....	Indian Refining (10)	119,100	12	15	12	12⅜	+ ⅜
24	17⅝	1.00	International Petr. (No)	12,200	19	19¼	18⅝	19⅛	+ ⅝
29½	21¼	.....	Lago Oil & Transp. (No)	12,500	24⅞	29½	24⅞	28⅝	+3⅝
37	16⅛	.....	Mexican Seaboard (No)	239,300	21	25½	20¾	22⅝	+2
67½	50½	.....	Pan Amer. P. & T., B (50)	15,700	58½	59⅞	58⅜	58⅝	+ ⅜
44¾	29¼	**2.00	Phillips Petr. (No)	273,400	33⅛	34½	32	33	− ⅛
54	35⅝	2.00	Prairie Oil & Gas (25)	6,500	38	38⅞	36⅞	37	+ ⅛
27¼	19½	1.50	Pure Oil (25)	28,500	21½	22½	21½	21½	.....
28¼	14¾	2.00	Richfield Oil (25)	93,000	18⅞	19⅝	16¾	17¼	−1¾
56½	49⅛	*3.20	Royal Dutch (N. Y.) (13⅓)	16,200	54¼	54⅜	51⅝	52	−2⅜
25½	18	1.40	Shell Union (No)	37,300	19⅝	19⅝	18⅝	19⅜	+ ¼
32	20	2.00	Sinclair Consol. (No)	341,100	23	26⅝	22⅞	24¼	+1⅜
42	28½	2.00	Skelly Oil (25)	32,500	30½	32¾	29½	29½	− ½
75	55½	2.50	Standard Oil of Calif. (No)	45,800	62¾	63⅞	61⅝	62¾	+1
59⅞	47⅝	2.50	Standard Oil (Ind.) (25)	73,100	50½	51¼	50¼	50⅝	+ ¼
40½	30⅛	1.60	Standard Oil (Ky.) (10)	17,200	32	32½	31¾	32	+ ¼
84⅞	58	†2.00	Standard Oil (N. J.) (25)	1,133,400	70⅞	75¾	70⅜	72¼	+1⅜
40⅜	30	1.60	Standard Oil of N. Y. (25)	104,300	32⅝	34⅛	31⅝	32½	+ ⅜
70	50	§1.00	Sun Oil (No)	2,700	58⅜	60	57⅜	58⅜	+ ⅛
60½	50⅛	3.00	Texas Corp. (25)	42,500	52½	53⅞	52⅛	52⅞	+ ⅞
17¾	10⅜	0.60	Tide Water Assoc. (No)	42,400	14⅜	15½	13½	13⅞	− ⅜
24	16¼	#0.30	Transcontinental, new (No)	96,600	18⅝	19¼	18⅛	18⅛	− ⅛
50	37	‡2.00	Union Oil of Calif. (25)	6,400	42½	42½	40½	41	− ½
97¾	76¼	‡4.25	Vacuum Oil (25)	32,200	88½	89⅝	85	85½	−3⅞
4½	2	.....	Venezuelan Petr. (5)	7,800	2¼	3	2¼	2⅝	+ ⅜

[1]Since close of last month's table. *Paid last year—no regular rate. **Plus 5% in stock. †Including extras. ‡Plus 4% in stock. §Plus 9% in stock. #Initial dividend.

gasoline pipe line from Oklahoma to points north in the vicinity of the Great Lakes, as announced in the daily press. Including extensions there will be 1,400 miles of pipe, constituting the largest of the four major gasoline pipe line projects so far undertaken by the industry. Substantial savings in transportation costs are reported to be possible through pipeline distribution of gasoline, and further developments in this field may be expected.

EXTENSIVE expansion of Richfield Oil Company of California along the Atlantic Seaboard, together with the burden of large inventories, had weakened its current position so that additional financing through public offering of a new security issue had been forecast. It is now reported, however, that arrangements have been made for strengthening the financial position through bank loans and private sale of a small block of stock to bankers, so that public financing will not be necessary at this time. The company has been applying itself with good success, it is said, to the liquidation of inventories, and expects to be on a sound basis in this respect by the end of the year.

SIX MONTHS report of Continental Oil reveals a decline in the second quarter net compared with a year ago, but a 20 per cent increase for the half year. Six months net after charges but before Federal taxes was $2,643,820 against $2,200,526 for the first half of 1929. It is interesting to note the relation between this net income figure and the amount of total income before charges of $13,594,440. Highly conservative bookkeeping practise is indicated, the charges constituting some 81 per cent of the total income and being in liberal ratio to fixed asset values.

SKELLY OIL suffered a sharp decline in earnings in the second quarter bringing six months net to $1,283,784, equal after preferred dividends to $1.09 per share of common, compared with $3,198,936, or $2.93 a share in the first half of 1929. Regular 50-cent quarterly common dividend was declared payable September 15, but this rate cannot be considered adequately covered unless some earnings improvement is witnessed in the current half year. This is quite possible, however, simply on the basis that company undoubtedly wrote off some inventory shrinkage in the past quarter which may not be repeated.

PHILLIPS PETROLEUM reports for the six months ended June 30, 1930, net after all charges equal to $1.70 a share. Since interim statements of previous years have given net before charges for depreciation, depletion, etc., comparison on the new basis is impossible. However, a substantial increase before such charges is indicated.

London Stock Exchange Prices

1930 High	1930 Low	Last year's Div. % per ann.	Share	July 15—Aug. 5 First	High	Low	Last	Change
1 1/16	5/8	3 1/2	Anglo-Ecuadorian	33/64	33/64	3/4	3/4	− 1/64
2 5/8	2	22 1/2	Anglo-Egyptian "B"	2 7/64	2 7/64	2 1/8	2 1/8	− 1/16
4 23/64	3	20	Anglo-Persian	4 1/16	4 3/64	3 39/64	4 3/64	+ 1/16
1 15/64	15/64	52 1/2	Apex Trinidad (5s)	1	1	15/64†	15/64†	− 1/64
2	3/8	....	Attock	1	1 3/4	3/8	3/8	− 1/64
3/8	1/16	12 1/2	Brit. Borneo (10s)	7/64	7/64	7/64	7/64	.. 1/64
11/64	1/4	7 3/4*	Brit. Burmah (8s)	1/4	1/4	1/4	1/4	....
1/4	1/4	....	Brit. Controlled ($5)	1/4	1/4	1/4	1/4	....
3/8	1/4	....	Brit. Prefd. ($5)	1/64	5/64	9/64	5/64	....
4 21/64	3 15/64	30	Burmah	4 3/64	4 9/64	4	4 9/64	+ ..
11/64	17/64	12c	Canadian Eagle (No par)	19/64	19/64	17/64	17/64	− 2/64
1 1/2	1 1/64	....	Creole Petroleum (No par)	1 1/64	1 3/64	1 7/64	1 5/64	+ 1/64
5/64	5/64	....	Kern River (10s)	7/64	7/64	5/64	5/64	− 2/64
2 21/64	1 5/64	12 1/2	Lobitos	1 15/64	1 15/64	1 3/64	1 3/64	− 1/64
3/4	9/64	6	Mexican Eagle ($4) Mex.	31/64	31/64	19/64	3/4	− 1/64
68	51	....	Pan American "B" ($50)	60	61	60	60 1/2	+ 1/2
11/64	7/64	5	Phoenix	9/64	9/64	17/64†	17/64†	− 1/64
35 1/4	30 15/64	24	Royal Dutch (100 fl.)	32 5/8	32 3/4	32 1/4	32 1/2	− 3/8
4 21/64	4 3/8	25*	Shell Transport	4 33/64	4 33/64	4 15/64	4 33/64	....
1/2	3/8	4	Steaua Romana	13/64	13/64	3/8	3/8	− 1/64
3 3/8	2 11/64	30	Trinidad Leasehold	2 3/8	2 7/64	2 11/64	2 11/64	+ 1/64
3/4	1/4	....	Utd. Brit. of Trinidad (6s. 8d.)	9/64	9/64	1/4	9/64	....
3 1/64	2 3/64	20	Venezuelan Oil Concessions	2 3/8	2 3/8	2 7/64	2 9/64	− 3/64

Nominal value of shares £1 unless otherwise indicated by bracketed figures.
*Denotes Tax-free dividend. †Denotes "Ex-dividend" price. cDenotes cents per share.

London . August

ANOTHER demonstration of resistance to surrounding depression has been given by the Oil Share Market during the past few weeks. Practically every other section of the Stock Exchange has been dull, and these conditions affected oil shares until towards the end of July. Only a measurable recovery has since taken place. A number of factors seem to have combined to bring this about, the principal being the decline in United States production over several weeks and the evidence that, despite sectional troubles, restriction in that country is more effective than it was a short time ago. Dealers realise that much ground has to be traversed before world oil conditions can be put right and prices raised to a more profitable level; but they regard the measures taken up to the present as being an encouraging sign.

Another favourable influence on oil shares was undoubtedly the publication of a new edition of Lloyds' Register showing the growing volume of motorship tonnage, the figures also revealing the enormous scope which still exists for expansion in the same direction. This furnished the market with a reminder that the lapse of time must inevitably bring an increased demand for petroleum products for marine and other purposes. Although the tone of the market has improved, the amount of business is still small, and the recovery of prices has been due to a shortage of shares on dealers' books, and in some cases to an actual bear account, rather than to any very active buying on the part of the public.

After reaching a new low for the year, Attock Oil advanced on anticipation of favourable results from deep drilling. Mexican Eagles were firmer following permission from the Mexican Government to construct a pipe line to Mexico City, where a new refinery is projected.

INCREASED efficiency at the Phoenix Oil and Transport Company's refineries in Roumania, as well as the larger output, contributed to the better financial results for 1929. This point was brought out by the Chairman at the annual meeting, but shareholders were informed that the full benefit of new pipe stills and fractionating towers was not felt until the latter part of the year. These plants are now fully realising expectations, so that this year's working should be even more economical. In the matter of output, the company has made a good start in the new financial period. Production increased to nearly 600,000 tons per annum during the first six months of 1930, and at the moment is at a substantially higher level. This has been due to the discovery of new oil bearing areas on the company's properties, and to the prolific character of the lower sands in the older fields. Reading between the lines of the Chairman's speech, the market in-

ferred that in drilling methods, as well as in refinery equipment, the business of the company is now being conducted on more efficient lines than ever before.

As the company's marketing organisation enables it to go into a number of Continental countries as a seller of oil products direct to the consumer, it has the prospect of a steady outlet for production. Its relations with the Roumanian authorities, too, are reported to be excellent. These factors appear to provide justification for the board's optimism, and although oil prices are low and future profits may be affected by plans to restrict production in Roumania, the shares would probably stand higher but for the rather unfortunate experience of British petroleum companies in Roumania from the financial point of view. As it is the £1 shares offer an investment return of well over 9 per cent, on the basis of the 5 per cent dividend paid for last year.

REPORTS from Bucharest of plans to restrict Roumanian production were read in London with a good deal of interest as indicating the introduction of oil conservation into European oil fields. The reports stated that the Astra Romana, of the Royal Dutch-Shell Group, and the Romano-Americana, a Standard Oil of New Jersey subsidiary, with the Association of Petroleum Industries, had come to an arrangement to reduce output by approximately 22½ per cent. As the agreement is stated to comprise producers of about 97 per cent of total Roumanian production, it appears to be quite watertight. Apart from the Royal Dutch-Shell interest, London is directly concerned in Roumanian oilfields through Phoenix Oil and Transport and Steaua Romana (British), with combined issued capital of approximately £5,800,000. Kern River Oilfields of California also has interests there through Kern Romana. A number of small and weakly financed companies have also been formed to operate in the country from time to time; but none have proved successful—some were never intended to. Their shares have not as a rule been readily marketable.

NECESSITY for heavy depreciation allowances prevented shareholders of United British Oilfields of Trinidad from receiving a dividend for 1929. The accounts, which were issued last month, showed that no less than £121,267 was written off the book value of wells, plant and machinery, including a special provision in connection with the initiation of rotary drilling and exploratory work. For 1928 the depreciation allowance was only £59,137, and as a result of the larger sum now required the accounts show a loss of £21,480 compared with a profit of £10,187 for the preceding year. The last dividend was 7½ per cent for 1927; but if the writing down for 1929 had been on the scale of 1928, the company's shares could have been restored to the dividend list with a repetition of this payment.

A small recovery took place in the price of the 6s. 8d. shares after the announcement of the results, operators taking the view that if the depreciation allowance was necessary, the only sound course was to make it. It was also pointed out that a part of the provision will be of a non-recurring nature. A much larger output was achieved in 1929 from the Parry lands of the company, and the refinery was operated at capacity to avoid as far as possible the sale of crude. But, the production from the Point Fortin and Los Bajos fields declined.

A. H. DAY.

Paris Bourse Prices

1929			July 1—July 29				
Div.	Par	Share	First	High	Low	Last	Change
.....	.....	Astra Romana	124	183	123	183	+ 59
.....	.....	Colombia	140	146	132	138	− 2
.....	.....	Concordia	125	123	117	118.50	− 6.50
.....	.....	Credit Gal. des Petroles act	842	842	695	798	− 44
.....	.....	Credit Gal. des Petroles parts	8325	8325	7300	7375	−950
.....	.....	F. Polonaise des Petroles act	134	134	119	120	− 14
.....	.....	F. Polonaise des Petroles parts	.....	519	430	.....	.....
.....	.....	Franco Wyoming	498	.....	.....	490	− 8
.....	.....	S. G. Huiles de Petroles act	598	608	566	582	− 16
.....	.....	S. G. Huiles de Petroles parts	264	276	251	262	− 2
.....	.....	Cie. Fse des Petroles	995	997	775	775	−220
.....	.....	Cie. Indus. des Petroles	970	975	950	960	− 10
.....	.....	Lille Bonnieres priorité	1270	1270	1120	1190	− 80
.....	.....	Lille Bonnieres ordinaires	775	775	715	770	− 5
.....	.....	Malopolska act	255	268	228	228	− 57
.....	.....	Malopolska parts	2325	2325	2090	2130	−195
.....	.....	Mexican Eagle	157	161	146	151	− 6
.....	.....	Omnium Internat. Petroles	168	.....	.....	167	− 1
.....	.....	Pechelbronn	1000	1000	970	970	− 30
.....	.....	Petrofina	585	612	565	593	+ 8
.....	.....	Royal Dutch	40850	40850	40000	40500	−350
.....	.....	Royal Dutch 1/10	4085	4225	4025	4055	− 30
.....	.....	Shell	596	596	578	584	− 12
.....	.....	Steaua Francaise	245	252	200	227	− 18

Paris - August

CONCORDIA held its annual meeting in Bucarest on the 25th of July. The shareholders were asked to approve a merger with the Société A. Roumaine Petrolifere & Miniere Sirius, and the Société Roumaine de Raffinage Vega. This is, in reality, only an act of concentration. The three companies are controlled by the same financial groups, who are also interested in the Société Petrofina.

Concordia is an old Roumanian Company of good reputation, whose oil production up till now has been good (roughly 4,900,000 bbl. in 1929), but whose activities have not always been very fortunate. The Société Vega is one of the small refining companies and Sirius an important producing company.

The amalgamation of these three companies should certainly form a powerful organisation, whose chances of success are greater than before, owing to greatly reduced overhead expenses. The merger will be effected by exchanging one new Concordia share against one Sirius share or one Vega share.

AN IMPORTANT event has occurred in Poland in French petroleum circles, namely the merging of the Omnium du Nord with the Consortium du Nord. The Omnium du Nord was an important Holding company and at one time very much sought after. It was decided at the last General Meeting held on the 27th of June to amalgamate with the Consortium du Nord, owing to the extremely difficult situation in which the company found itself. Thus yet another of the powerful French oil companies who have operated for years in Poland and expended millions of capital in that country is about to disappear.

We are on the eve of the liquidation of the Société Dabrowa, another of the big French companies operating in Poland, and whose capital amounted to nothing less than 200 million francs. The greater part of that money has been lost. It has been decided to exchange two Consortium shares against 25 ordinary shares of the Omnium du Nord, and eight Consortium shares against five founders shares of the Omnium.

E. J. ANDRÉ.

The Foreign Oil Legion

J. ELMER THOMAS, who contributed to the May WORLD PETROLEUM, the article "Law of Diminishing Returns," which made a profound impression throughout the oil world, has sailed for Europe, combining a vacation with a study of European oil production.

▼

E. G. SEUBERT, president, Standard Oil Co. of Indiana, and R. G. Stewart, president, Pan-America Petroleum and Transport Co., have arrived together in London on the business of their respective companies.

▼

W. S. DOYLE, representative of the Royal Dutch-Shell group at Caracas, is known as the dean of Venezuelan oil diplomats, having handled oil affairs of state in that country for about 18 years.

▼

W. S. Doyle, dean of oil diplomats in Venezuela.

Leon C. Booker, representative at Caracas for the S. O. of N. J.

▼

LEON C. BOOKER follows closely upon Mr. Doyle's record, having charge of the Creole Petroleum Company's and the West India Oil Company's interests at Caracas, Venezuela, for 10 years.

▼

KILIAN E. BENSUSAN, South American representative of the Chicago Pneumatic Tool Company, is on vacation in the United States after three years around the oil fields of Venezuela, Colombia, Trinidad, Argentine, etc. Mrs. Bensusan, who is with him, is an author and contributes the well known "Tropical Tramp" articles to the Maracaibo Herald, Venezuela.

▼

H. S. LYNE, field manager and geologist for the South Australian Oil Wells Company and a subscriber to WORLD PETROLEUM, writes us that he has just succeeded in bringing in a small oil well at Lakes Entrance, Victoria, at 1245 ft. The initial production was 10 bbl. per day of good gravity oil, consisting of 25 per cent heavy kerosene, 57 per cent light and heavy lubricating oils and 16 per cent bitumen. It is thought that the hole is on the edge of a pool. Two more holes are now being drilled.

▼

JAMES KENNEDY, marine manager for the Gulf Refining Company, has just returned to New York from London where he acted as chairman of the tanker committee at the recent international ship load-line conference.

▼

D. D. MACGREGOR, of the Associated Oil Company of San Francisco, California, recently sailed for Japan on the motorship "Chichibu Maru" where he will act as Vice-President of its Mitsubishi Oil Co. Under Mr. MacGregor's supervision will be built a new 5000 bbl. refinery near Tokio, to be operated jointly by the Associated and Mitsubishi companies.

▼

CAPTAIN C. H. DURANT, marine superintendent for the Lago Petroleum Corporation (S. O. of Ind.) at Maracaibo, Venezuela, has about completed his vacation in Nova Scotia.

▼

LEON WENGLER and a dozen geologists recently arrived in Persia prospecting for oil for the Société Franco-Persian. Mr. Wengler until recently has been in charge of wildcatting in Venezuela for the Société Française de Recherches au Venezuela, where three wells were drilled.

DR. W. G. WOOLNOUGH, geological adviser to the Commonwealth Government of Australia, sailed from Los Angeles on August 9th for South America on board the motorship TARANGER, following an interesting time studying oil production in the United States.

▼

W. W. COLE, manager of foreign sales for Byron Jackson Company, Los Angeles, is now in the Caribbean on the last stages of his trip through the oil fields of the world.

▼

R. Meyer, chief of construction at the Curacao refinery, D. W. I.

▼

R. MEYER, chief of construction at the Royal Dutch Company's great refinery at Curaçao, D. W. I., is the son of the man responsible for installing the first Diesel engine in an ocean tanker, namely the Anglo-Saxon Petroleum Co.'s "Vulcanus" in 1910. Mr. Meyer, Sr., then was superintendent engineer for the company operating the Royal Dutch-Shell's international oil-carrying fleet, the latest order for which consisted of 20 Diesel tankers.

▼

WILLIAM PIEZ, brother of Charles Piez, who is Chairman of the Link Belt Company, will wander around Europe for this concern, having just been appointed European correspondent. He has been living in Paris for the past two years, and will continue to make that great French city his headquarters.

▼

The Editor of WORLD PETROLEUM is glad to receive notes, articles and photographs from members of the Foreign Oil Legion in all parts of the petroleum world. All manuscript should be double-spaced typed.

▼

The portraits on this page were taken by a member of the editorial staff of WORLD PETROLEUM.

▼

Oil Field Machinery Exports

For the first six months of 1930 exports from the U. S. A. of oil-well and oil-refinery machinery exceeded that of the first six months of 1929 by more than three million dollars. The total value was $15,833,838 compared with $12,833,383 for the first half of last year.

World Marketing of Fuel Oils

Commercial and Economic Obstacles of Wide Diversity Faced and Handled in Building One-Fifth Billion Barrel International Trade on Land and Sea . . . By T. Orchard Lisle

In Collaboration with a Great Oil Company

FROM the one-and-a-half billion barrels of crude oil now annually drawn from the ground and refined, there is produced an enormous quantity of fuel oils—boiler, gas, furnace and Diesel—of varying grades almost equalling in quantity the total amount of gasoline consumed by the thirty-million motor vehicles now in service. To create a world-wide market parallel with the growth of automobile fuel, and to keep these fuel oils moving along with the gasoline, thus preventing either a surplus or shortage of the heavier product, offers both commercial and economic problems of major nature. Then again, the marketing businesses of the executives in London or Paris have to be studied from different angles from those of the executives in New York, Buenos Aires, Moscow or the Hague. Each company and each country have their own particular problems.

Development and growth of new trade routes, and shifts in important sources of supply, constantly produce new angles to be solved. Strange as it may seem fuel oils often pass each other on the high seas, as an exporting country often imports, and an importing nation frequently exports, but usually in smaller quantities. This probably is partly due to individual and independent marketing efforts. In 1929 the United States, for instance, exported 35,714,784 bbl. of fuel oil to 81 countries, and imported 20,545,498 bbl. from 12 countries. In addition, American vessels and those of other countries together bunkered in U. S. ports, 52,277,872 bbl. of fuel oil. From various oil-producing countries the United Kingdom of Great Britain and Ireland imported in June of this year 1,097,296 bbl. of fuel oil. Yet she exported 501,131 bbl. of fuel oil refined from imported crudes. The numerous factors involved in purchasing, transporting on land and sea, storing and marketing of not far short of one-fifth billion barrels are not handled without much thought and co-ordination, although an international petroleum association, if formed, should be able to increase co-ordination and reduce wasted effort.

Tonnage and Storage

Tankship tonnage must be built and kept moving, storage tanks have to be ordered, shipped and erected and maintained in hundreds of ports, and these tanks must have adequate capacities to meet the varying local demands in an economical manner in order that fuel supplies are always available on demand. Yet they must not exceed requirements to the extent that too much oil is idle for extended periods. The new freight and passenger shipping routes continually opening up simultaneously with old ones growing or being abandoned, or ship movements varying with fluctuating trade conditions, have their effects on demand in certain sections only under normal or abnormal times, and differ from the effect on demand resulting from a universal slow-up as exists this year. Ocean shipments of fuel oil must co-ordinate with the movements of the enormous quantities of gasoline, as often the same tankers are used. Perfect collaboration between the marketing and transportation departments is a big factor in this respect.

New York has one of the World's most important fuel bunkering and tanker loading stations.

Ocean Shipments

According to U. S. government figures overseas boiler and Diesel oil shipments flowing in different directions to and from the leading countries of the world, while showing fluctuating tendencies, have an upward tendency. In 1929 no fewer than 74,000,000 bbl. were transported on the high seas to the 22 countries importing over one million bbl. each. Shipments to other countries bring the total to about 100,000,000 bbl. Eleven countries alone required 30,000,000 barrels of American-refined kerosene in addition, not to speak of 17 countries that imported over a million bbl. of U. S. lubricating oil each. Expansions in some cases have been very rapid; in others very slow. In 1922 bunker oil sold at the Panama Canal was 2,489,000 bbl. compared with 12,383,000 bbl. sold in 1929. In the same period Diesel oil at the Canal increased from 69,000 to 1,013,000 bbl. We will not discuss the enormous ocean movements of crudes and gasoline, as this article is limited to heavy refined oils.

Even in the oil business, particularly among those engaged in oil producing fields, it is not widely known that for fueling ships of all nations there are storage tanks in 173 ports in more than 75 countries, having an aggregate capacity of 35,000,000 bbl. In some of these ports half-a-dozen, or more, companies have facilities. There also are storage tanks at strategic positions on the rivers and great lakes of the world; but these are mainly

handled by land and inland waterway transportation systems.

It is not difficult to imagine the task of arranging tanker shipments in an economical manner, especially when tanks are being drawn upon irregularly by bunkering ships, of which about 3000 of the ocean-going type are now Diesel driven, and require a better grade of fuel than steamers on the same trade routes. Harbor craft, coastwise vessels and pleasure craft also draw from these world-wide bunkering stations. The tankers which carry the bulk oil have to be fueled, too! In addition to 3000 motorships, the aggregate tonnage of oil-fired steamships now amounts to over 19,500,000 gross tons, and the total horsepower about 25,000,000, the consumption averaging one pound of oil per h.p. hour.

Land Shipments

On land, steam and Diesel power stations, factories, apartment houses, hotels, private homes, etc., have to be supplied by railroad and tank wagon deliveries and, of course, fuel specifications are quite diversified. Sometimes one grade of oil is required for power, and another for heating. The problem of meeting the specifications is one for the oil companies, but on land the distribution and marketing sometimes is in the hands of local distributors, this depending upon the country and location. The individual requirements usually are much smaller than marine bunkering, unless for a big central station burning oil under boilers, or in Diesels.

Source of Supply

With rapid changes in refinery operations and changes in production, there is the question of the most economical source of supply to a fixed point of distribution to be considered. Then there arises the problem as to whether this source of supply will remain fixed for a lengthy period, because of the rapid changes cited above —to say nothing of continual shifts in transportation rates brought about in part by the turning over of clean and dirty bottoms, in addition to the excess or shortage of respective tonnage.

Recent years have seen increases in crude production in Russian, Venezuelan, Roumanian and other fields and as a result fuel oils from these sources have increased in their movement into European ports. In face of this, however, it is found that American exports of fuel oils have substantially maintained their level, due largely to the combination of excess production and the business activity behind export sales work. Recent figures for Russian production for the year 1929 show 103,000,000 barrels, and from some sources it is predicted that they will produce 130-150,000,000 bbl. per year, if not more and exceed that of Venezuela, especially since it is expected that conservation in Venezuela fields will soon show its effect. In fact, the Soviets have set 294,000,000 bbl. as their 1933 goal. If attained, marketing and transportation will be a tremendous problem for the Russian authorities to solve.

Although deeper drilling in California, and new wells in Texas and Oklahoma have increased production over the last three years, it is estimated that 1930 production in the United States will be approximately 940,000,000 bbl. as against 1,002,000,000 bbl. in 1929, or a decrease of 6.1 per cent, much of which can be laid to semi-successful curtailment steps. Taking a bird's-eye picture of the situation today, it would appear that there are too many oil wells in active production and much has yet to be done in the way of conservation. The above tabulation gives a ten-year record of leading oil producing countries.

Ocean Tonnage and Rates

The past year saw a comparative shortage of tonnage with a resultant fixture of high rates during the year. Next year undoubtedly will see an over-supply of tankers, reversing the situation, as there are building about 170 ocean bulk-oil carriers having a d.w. capacity of about 1,750,000 tons, or nearly as much as the world's oil fleet of 1914. Many of the levels and much of the strength of the oil industry's marketing system have their origin in transportation. First: tank steamers are naturally an integral part of the necessary cost of marketing. The rates for transportation affect the prices at which oil fuel may be sold. As an essential part of the cost of marketing, they largely determine in what markets production of a particular field is moved, thereby establishing trade centers. Factors determining the efficiency of transportation rest on such basic considerations, as (a) the tank steamers available to carry the product; (b) the speed at which the product is carried from point of supply to point of distribution; (c) the speed at which the product may be handled at terminals. These factors, of course, apply to both tank steamers and tank cars,—in the latter case to interior points.

It is obvious that costs are less per barrel, or per ton to load or unload larger tankers and tank-cars than for an equal quantity shipped in smaller units. The size of lines with which the vessels are equipped to load and discharge cargoes and the size of lines used at loading and discharging terminals are important, to say nothing of interior plants being suitably equipped to handle with dispatch the unloading of tank cars.

In many instances, these very important and desirable facilities are not taken any too seriously, the consumer not realizing such mediums of transportation when discharged promptly enable the supplier to deliver subsequent requirements with less delay. Then, too, ample facilities minimize the necessary evil of demurrage. By way of illustration—what would tanker rates be today if it took

	United States Bbl.	Mexico Bbl.	Venezuela Bbl.	Russia Bbl.	Persia Bbl.	Others Bbl.	Total Bbl.
1920..	449,151,000	157,069,000	457,000	25,430,000	12,230,000	50,769,000	695,106,000
1921..	472,897,000	193,398,000	1,433,000	28,968,000	16,673,000	53,281,000	766,650,000
1922..	556,512,000	182,278,000	2,201,000	35,692,000	22,116,000	58,949,000	857,748,000
1923..	746,516,000	149,585,000	4,201,000	39,147,000	25,230,000	65,165,000	1,029,844,000
1924..	719,346,000	139,678,000	9,042,000	45,355,000	32,373,000	73,936,000	1,019,730,000
1925..	760,059,000	115,515,000	19,687,000	52,448,000	35,038,000	82,531,000	1,065,278,000
1926..	766,668,000	90,421,000	36,911,000	64,311,000	35,842,000	98,535,000	1,092,688,000
1927..	906,416,000	64,121,000	63,134,000	77,018,000	39,688,000	115,983,000	1,266,360,000
1928..	888,676,000	50,150,000	106,000,000	87,800,000	42,080,000	134,865,000	1,309,571,000
1929..	1,001,702,000	44,656,000	137,536,000	103,000,000	45,250,000	154,094,000	1,486,238,000

During recent years Willemstad, Curacao, has greatly increased in importance as a fuel-oil bunkering station.

twice as long to discharge such cargoes? The time gained at sea through building tankers to make the highest economical speed would be lost to the oil companies. The same rate question readily applies to tank cars or any other medium of bulk transportation.

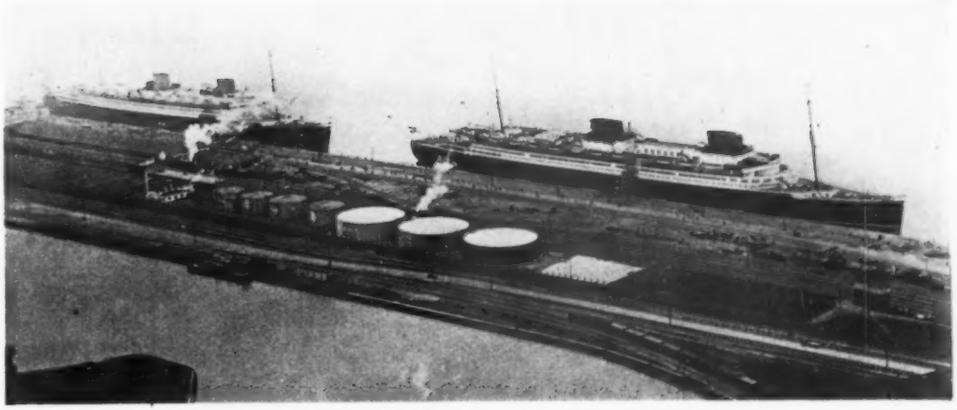
Large ocean-going passenger vessels of today with quick turn-arounds would be seriously handicapped without adequate facilities to meet these conditions, which certainly contribute to economy. Railroad sidings of warehouses and industrial plants would be cluttered with cars awaiting unloading if ample facilities were not available. Efficient transportation and handling facilities unquestionably constitute an important item in economical distribution and marketing of fuel-oil products. Too much cannot be said concerning the importance of large lines and ample storage capacity.

Specifications of Fuel

One of the problems with which the petroleum industry is confronted is the wide and varied specifications of fuel oils. For instance, many countries have certain diversified opinions on the subject of what type of fuels are best suited in their naval vessels. Not infrequently a restriction is placed by one country on some specifications which might not be wholly acceptable to its neighbor. Government and commercial requirements of gas-oils of various countries call for certain varying characteristics, and where they are not strictly adhered to an increase in import tax is fixed.

Generally speaking it can be said that Diesel engine builders all over the world have their own individual ideas as to what characteristics determine a suitable fuel for the operation of their own particular engines. Such conditions have required considerable missionary work on the part of the petroleum industry in the form of education. Much has been gained by formation of committees on standardization and bringing clearly to the engine builder the fact that his equipment should be so designed to meet varying fuel conditions, permitting refueling at various ports of call where Diesel fuels might be of different characteristics. Unless this is conformed to, the cost of Diesel fuels will always be somewhat higher than they otherwise would be, owing to the costs involved in the matter of storing and handling diversified grades of fuel.

Going further into the matter of gas oils, we find public utilities and municipalities requiring gas-oils for gas enrichment have, in many instances, their own ideas as to suitable oils for this purpose. Metallurgical work in some cases requires a special fuel oil. The result of these conditions tends to bring about an uneconomical situation, necessitating segregation of crudes and finished products, in addition to increasing storage capacities. Storage is costly and it is evident that if such a practice were paramount, the prices of finished fuel and gas-oils would have to carry the additional burden.



Fueling the giant ocean liners Bremen and Europa at Hamburg.

Engineers of vessels forming units of large fleets very often have varied and diversified opinions as to what represents good oil fuel. These opinions might be widely different even though two ships may be practically identical in every respect, having the same type of oil-firing equipment of Diesel engines, as the case may be. Here some effort is required to fuse their opinions and convince them that the flexibility of their machinery enables them to handle oil fuels of varying characteristics. One of the early problems was in demonstrating the lack of relationship. between gravity and viscosity. Sometimes similar conditions apply in the case of Diesel power plants on land.

The oil industry of the world today is much opposed to waste of petroleum products, and is doing much toward working out fuel burning problems in its many laboratories and is co-operating with ship-owners, public utilities, boiler and engine builders, and operating-engineers in an effort to bring about the best results in proper handling. Many major companies today through their own development laboratories have invested huge sums of money in various types of power plants such as Diesel engines, and various types of oil-burning equipment. The knowledge gained from handling such equipment and from their own ships in service, places them in better position to have a closer understanding of the problems confronted by the consumer, and so increases the efficiency of world-wide marketing of fuel oils.

Unloading petroleum products at Algiers.

What a tropical storm did to derricks on Lake Maracaibo.

Capping a Venezuelan Blow-out

Terrific Rock Pressure Controlled by Locally-made Emergency Capping Device in Sixty Hours Continuous Work on a V. O. C. Well on Lake Maracaibo . .

DRILLING in Venezuela during the last eight or nine years has not been without its dangers and difficulties, and the bringing-in of some of the wells on Lake Maracaibo has been attended with very high pressures. Drilling strings have been blown as high as a thousand feet into the air, and entire wells have cratered and derricks and equipment have disappeared into the water and sunk below the bed of the lake. At other times terrific storms have swept across this wide inland water carrying derricks, platforms and stagings with them. To the *Maracaibo Herald* we are indebted for an instructive account of the recent capping of a wild well at the Cabimas field of the Venezuelan Oil Concessions (Royal Dutch).

On Tuesday, July 8, at 4:00 p. m., while the crew on V. O. C. Well No. R-420 were changing tour, the well "blew in" and went on a wild rampage that afforded a sight for old timers as ranking in the major class of wild wells in the Venezuelan oil fields.

Although this well was out of control only three days, during which time it was actually blowing wild for 36 hours, which alone is remarkable and reflects on the unrelenting efforts of the field force under the direction of Mr. Higgins and Mr. Rockwell, Field Superintendent, and Drilling Superintendent respectively, it nevertheless put out a deafening roar of defiance that called for considerable pluck and skill to bring it under control.

Lago gusher on Lake Maracaibo.

Combined with an enormous rock pressure, this well was putting oil 100 feet over the crown block through the 8⅝" water string. Actual recoveries of oil showed that the well was producing at the rate of 1,500 to 2,000 bbl. per hour. This alone would indicate the hazardous nature of conditions under which the job was successfully completed.

In the first attempt to shut the well in, and after the blow-out preventer had been secured in place, the well cut out the packing rubbers and a few hours later the master-gate also cut out leaving very little good material above the cellar to work on. This condition was overcome by Mr. Rockwell in a capping device which was turned out of the camp machine shop in record time. It consisted of a 6⅝" extra heavy Xmas tree made up with four 6⅝" valves on two joints of 6⅝" casing. The bottom joint of casing was fitted with a rubber packing ring. Above the packing ring gunny sacking and rope were wound tightly, offering further expansion snugness after taking the pressure. Above this improvised bottom packer the actual blow-out rubber was placed.

This device was swung in place with the four cross-valves open. The stabbing of the 6⅝" into the 8⅝" in the cellar presented a problem in itself, due to the whipping that was caused through contact with the tremendous pressure. This was overcome by a unique hook-up of lines through snatch blocks at the four corners of the derrick. After the "Cap" was centered, it was snubbed down to place by pulling up the travelling block by the steam engine, and the Xmas tree was gradually snubbed down into the 8⅝". After this was accomplished the valves on the Xmas tree were gradually closed. Closing the valves left the expanding rubber and other material to do their work under the heavy pressure, and with a last dying hiss the well was "capped off" at one o'clock on the afternoon of July 11. Meanwhile a fire safety guard had been organized, earthen dykes created, and a formidable battery of pumps erected. Remarkable too, that all the oil was recovered.

Considerable credit is due to the Field Engineer Mr. Oppentogt. Under his direction men and materials were assembled, and all the engineering problems that were met with were overcome in a smooth and efficient manner. To a man they were some 60 hours in continuous service under a terrific strain; during the day they carried on under a hot tropical sun, and worked throughout the whole period in an oil-drenched condition.

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Rumanian Situation Now Brighter

SHORTLY following the report that both the Standard and Royal Dutch interests will ease the serious over-production situation in Rumania, by taking all export excess supplies of Rumanian crudes and refinery products, came the announcement that the Spanish Oil Monopoly has decided to purchase Rumanian oils instead of renewing its contract with the Soviets. This looks helpful so far as the Rumanian situation is concerned, even though some of the smaller companies may not be willing to accept the Standard and Royal Dutch prices and terms.

New Light On Russian Oil Progress

Hitherto Unpublished Comments on Accomplishments of All U. S. S. R. Production Fields, Refineries, Transportation and Exports in Five-Year Program . By Basil Zavoico

JUST how far can Russia carry out her huge five-year production, refining and marketing plan? That is a question on which every oil executive whose operations are international would like an accurate answer. In this article Mr. Zavoico reviews Soviet facilities and progress to date, and paints a clear picture of today's situation and tomorrow's probabilities. He brings out into the limelight many important factors not previously known or discussed outside of that vast country. Will the U. S. S. R. engage in an international oil-trade war? This very important question also is answered by the author. While we cannot vouch for the statements, the article should be read by every oil man, as the author is well-posted on Russian oil. On another page we give the latest U. S. S. R. official progress figures.

THE 1929/30 operating year of the U. S. S. R. five-year petroleum program will end on September 30th, 1930, but already at this time the results are apparent. The originally planned schedules of production and refining will be achieved, even in their lately increased amounts. According to the older schedules during 1929/30 operating year all Russian fields should have produced 112,500,000 bbl. of crude oil, the present increased plan indicating a total recovery of 120,000,000 bbl., while the crude oil runs to refineries have been correspondingly increased from the planned 97,000,000 bbl. to presently indicated 103,000,000 bbl.

It is very important at this time to consider the future programs which call for production of 160,000,000 bbl. during the 1930/31 operating year, and ending the famous five-year plan with 300,000,000 bbl., or better in the 1932/33 operating year, as compared with original estimate of 187,000,000 bbl. Actually it is anticipated to practically treble the production in the next three years. To be able to pass judgment on the possibility of achieving this stupendous task a brief discussion of all dependent factors is necessary, as the realization of such a plan will throw on European markets a minimum of 50,000,000 bbl. of gasoline in the year 1932/33, in addition to correspondingly large amounts of other petroleum products.

Production from the Baku Fields

Apsheron-Baku oil fields continue to be of primary importance, and will be accordingly considered first. During the last operating year, 1928/29, Baku fields produced 62,100,000 bbl., while this year's production will reach, according to plan and present indications, about 72,000,000 bbl., the 1930/31 program calling for 93,500,000 bbl. and the 1932/33 operating year requiring about 150,000,000 bbl. All this production is to be derived presumably from the old fields, since no new fields of any importance were discovered by the Azneft from the time of its organization in 1920, though wildcatting was active during most of the last decade.

The results of the current year, even though fulfilling the plan, may be regarded as eminently unsatisfactory from the Soviet angle upon careful analysis, and the continuous huge production of Baku fields will not only stop increasing indefinitely as anticipated, but are likely to show very sharp declines within very few years.

The program in Baku fields has been fulfilled to the extent of 95.6 per cent of the plan during the past 6 months of the current year, 33,800,000 bbl. having actually been produced.

The failure to complete the year's production plan in full has been due to several important factors: (1) Decrease in proportion of gusher production from 30.8 per cent last year to 26.3 per cent this year; (2) Production from old wells has been declining considerably faster than figured by the planning bureaus. Instead of 2,000 bbl. per well per month, as anticipated, only 1,800 bbl. has been obtained; (3) The Vth horizon of the Surakany field proved disappointing, the VIth in the same field now being developed also did not come up to expectations so far; (4) Kara-Choukour extension of Surakany field is being developed very slowly and the potentialities of this sector are unknown yet, but it appears definitely established that it does not compare with any of the older famous pools of the Apsheron. Production of this extension during the first six months of 1929/30 amounted to 164,000 bbl., falling 45 per cent short of the plan.

Old Methods Discarded

While the above factors may have caused the present underproduction, which is still continuing, the underlying reason for it is different. During the past 40 years the 12 square miles which comprise all major fields of Baku district have been developed very slowly. The wells took as long as one year to complete to the depth of 2,000 feet, using antiquated percussion rod rigs. The flowing wells were produced wide open with all gas escaping; few wells were on air-lift, the majority being produced with ordinary bailing equipment. Since nationalization of fields, rotary rigs have been introduced, until today all drilling is done by fast American rotaries, also deep pumping units substituted the bailers. Both these improvements caused the oil to be produced, relatively speaking, very much faster; but at no time did total production greatly exceed that of 1916, although in the current operating year a total of

1,200,000 feet will be drilled in Baku fields, as compared with 530,000 feet drilled in 1913. In other words the Soviet Planning Agencies are figuring on the increased Baku production, not considering the factor of rapid development and depletion, with which they are so far unfamiliar.

Reserve Sands Affected

The results of faster recovery from old sands necessarily affected the lands held in reserve. In the first few years of nationalization large proven parcels were classified by Azneft as reserves not to be developed until an emergency actually existed. Meanwhile wildcatting in new areas was pushed, the same being applicable to rich deeper horizons of Surakany and Bibi-Eibat pools. At this time, on the contrary, the whole burden of the increases planned for the current and coming years falls on the richest parcels and horizons, which show large initial gusher production, this being confirmed by 32.8 per cent increase in production of Bibi-Eibat in the first half of 1929/30 and a 12.8 per cent increase in production of Surakany, the latter increase falling very much short of the planned 25 per cent; and also by the average month well production of new wells which was 12,000 bbl. against 8,000 bbl. as planned.

It appears certain that Azneft is now forcing production by development of its richest reserves, and the continuation of the present high rate, or its increase, is entirely dependent on new discoveries, or increased rate of drilling, the latter affording but very temporary relief. The present production in Baku fields varies between 200,000 bbl. and 220,000 bbl. per day, and these figures are just about the top under efficient production plans, even the maintainance of this level requiring regular discoveries of deeper production to furnish about 30 per cent of flush flow. Temporarily present Baku fields may do 250,000 bbl. per day under forced drilling campaign, but at this time the figures indicated for 1930/31, 1931/32 and 1932/33 appear to be entirely too optimistic.

The Azneft is experimenting with windmills for pumping oil wells.

Wildcatting Results

The most unsatisfactory phase of the Azneft Oil Trust is its wildcatting, which so far has been without tangible production results. The trust continued developing areas which were already tested by major companies prior to nationalization, and which to some extent were already condemned. Thus in Kala district the results have been amazing, the development started in 1914 by private interests, and has continued until now, the Azneft probably having sunk as much as 15 dry holes within small area, which in U. S. A. would require but two tests at the most for discovery or condemnation, in Russia after ten years of continuous development the area is still in indefinite state. An interesting development in Baku, is the beginning of an 8,000 ft. test in old field, to test the Miocene and Oligocene formations, which outcrop on the Apsheron Peninsula, showing good saturation of oil and which should produce very well. The probable depth of the new horizons is in excess of 4,500 feet, and therefore they should not seriously affect production for several years.

Summing up the situation of Azneft it must be concluded that large increases of production from Baku fields are very unlikely, unless new major fields are discovered very shortly. Even if such discoveries will take place in the near future, the commercial development of the new fields will require three to five years under Soviet conditions.

N. Caucasian Fields Occupy Second Place

The North Caucasian oil fields are occupying at this time the second place in Russia and the developments of Grozny pools resemble those of Baku in several respects. The North Caucasus produced during the first half of 1929/30 operating year 20,000,000 bbl., or 105.0 per cent of the plan, the increase being due to large new production in Maikop area of Kuban Province, as well as to increased gusher production of the main New Grozny pool. The Grozneft is forcing the development of prolific reserves of the New Grozny pool, the gusher production of the trust having gradually increased from 60 per cent in 1924/25, to 76.6 per cent in 1928/29 and finally to 80 per cent in the current year. Again it may be observed that modern equipment is forcing drilling and production, but whether the production can be increased for many years without adding new fields is highly problematical.

Grozneft plans to produce 61,000,000 bbl. in 1930/31, 78,000,000 bbl. in 1931/32 and 97,000,000 bbl. in 1932/33 operating years, as compared with 40,000,000 bbl. in the current year. Since the two Grozny pools, Old and New, are of rather ordinary structural type, and do not in any way compare with the Baku fields, new discoveries must be made.

Gasoline Content of Oils

At this time what I consider to be a most illogical point of Russian Oil de-

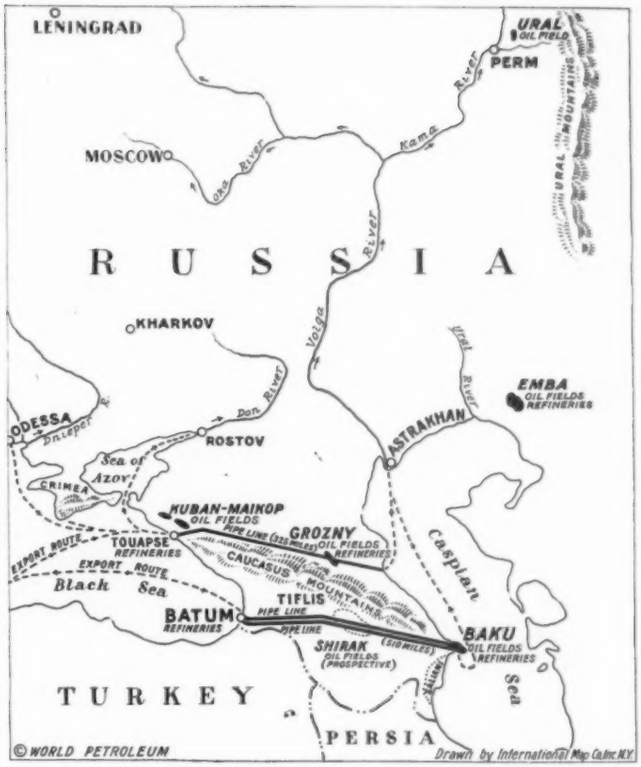
Bibi-Ebat Bay oil field.

velopments has to be discussed. In the past few years, 1920 to 1930, the Soviet Government had two main objectives in view, one—to open new fields and increase production to be able to increase exports, thus obtaining foreign currency; the other—to produce as much gasoline as possible, the most valuable exportable product. Accordingly much wildcatting took place in Baku and Grozny, some 500 miles from export seaports, and even in Emba some 1,000 miles from Black Sea, all crudes from above areas testing very low in gasoline, the Grozny oils alone averaging above 15 per cent, while Baku crudes run under 8 per cent. Expensive pipe lines were constructed from Baku and Grozny to Black Sea ports. Meanwhile the Kuban-Maikop fields lay dormant, though situated not over 50 miles from the Black Sea; also the crude from Maikop fields averages 35 per cent in gasoline. In other words the most logical source of the most suitable crude oil has been entirely neglected.

That such has been the case can be easily seen from the following dates: Kuban-Maikop district was first opened up in 1909, in 1911 production reached 1,050,000 bbl., in 1923, under Soviet regime, the first large gusher was completed estimated good for 24,000 bbl. per day with huge amount of gas, in the summer of 1928 another gusher was completed for 6,400 bbl., in January, 1929, a 16,000 bbl. well was completed with gas pressure of 46 atm., and finally at this time the proven territory of large wells is 3.5 miles long, with several large shut-in gushers, no pipe lines, either built or planned, no storage facilities, all this but 50 miles from new refineries at Touapse on the Black Sea, which could use not only the crude, but as well burn the gas from the Maikop fields.

Kuban Field Tremendously Important

Finally, however, the Kuban Province fields have been apparently noticed, for the production has been increased to 1,670,000 bbl. during the first half of the current year, from the originally 520,000 bbl. planned, while 1932/33 plan calls for 12,000,000 bbl. to be produced by Maikop. In reality, however, this figure will be greatly increased, compensating the Baku and Grozny pools which apparently have reached their maximums already. Also pipe lines are being considered to the Black Sea, carbon black plants are discussed, etc. Fundamentally speaking, the Maikop fields offer at this time the greatest competition possibilities to international gasoline trade. The fields are still considered of the lenticular type, but most likely represent anticlinal structures aligned in a definite trend. More important, however, is the fact that the immediate potential oil producing territory of Kuban-Maikop is in excess of 25,000 square miles, while the present depth does not exceed 2,000 feet, in other words the area has been just scratched.



Showing location of pipe lines and refineries.

Cumulative geological evidence indicates that the Kuban province will become the most important factor in Russian oil industry, supplanting the Grozny fields within few years. In addition to being located most favorably for export trade, the Kuban fields can supply by water routes the whole of Russian industrial and agricultural South via Black and Azoff seas and rivers Don, Dnieper and Boug.

Progress in Oural Field

Next anomaly to be discussed is the Oural development. While drilling for potash, a very small oil well was struck in Perm Province in limestone formation similar to those of Southwest Texas and Persia. A vast territory west of Oural mountains was open for wildcatting. The discovery was situated on the Volga river system, which furnishes ideal water routes to practically all Central Russia, also the new field was not very far from the Oural industrial centers. In order to develop the new field rapidly a very large number of locations was staked close to the discovery well without sufficient investigation, results were negative, some wells not finding any oil whatsoever, the others encountering minor shows and no production.

The next step was to remove the locations further away from the original discovery, still without positive results, until at this time the Ouralneft decided on plain wildcatting in the whole basin. 44 rigs are operating in the Oural district, all near the discovery well; during the first half of 1929/30 operating year 15,000 bbl. were produced, or a daily average of 85 bbl. No detailed and competent surface geological surveys have been reported so far, all geological work and opinions being rendered by geologists from other fields who are sent for few days work, and who seem to be entirely unfamiliar with Permian stratigraphy. The Oural-Volga Permian Basin represents a tremendous potential natural supply of oil for interior consumption, and when developed will affect the export markets, by releasing much of the Caucasian oil for the exports.

In the Emba Salt Dome fields no new discoveries were made. The region is very far away from trade routes and is of are to connect Emba fields by pipe line purely local importance. Present plans with Southern Oural provinces.

Russian Turkestan Increase

A discovery of considerable importance was made in the old Shor-Su field of Russian Turkestan. Well No. 14 was completed for 2,500 bbl. initial per day, at the depth of 1,200 feet, settling down to 1,000 bbl. This one well increased the April production of Turkestan to 39,400 bbl. from 15,000 bbl. produced in March. The great importance of this discovery is that it will supply the needs of Turkestan and Central Asia provinces, where at this time rapid development is taking place, more particularly in the growing and manufacture of cotton. A large amount of oil from Baku fields will be released for export trade, Turkestan deriving its petroleum products from Baku until now.

Production in Sakahlin

The Sakahlin Island production remains small and so far insignificant. Large distance from center of Russia excludes the possibility of rapid development, while rigid Winters add to the difficulties.

Problem of Oil Field Supplies

Disregarding the geological factors, the greatest difficulty of Russian Oil Trusts is in supplies. All drilling and producing plans are built on intermittent supplies by Russian factories and from imports. Actual results in the first half of the current year illustrate the seriousness of the situation:

Supplies	Per Cent Fulfilment of the Plan
Cement for wells	60 (in February 1930 but 27%)
Pipe, drilling, csg.	40
Rigs	40
Pumps	37
Rods	17
Lumber	No data available, but lack of lumber is delaying work by months.

Direct results of this disorganization is the footage by month per operating rig: in Baku in the producing area—290 ft.; in Baku wildcat areas—125 feet, and in Grozny wildcat areas—150 ft.

Production by 1933

The combined production summary for the Soviet Union is at this time not as optimistic as the revised five-year plan would seem to indicate. It appears that 300,000,000 bbl. by 1932/33 is out of question, the 200,000,000 bbl. figure being more in line with actuality. Tentatively that year's absolute maximum by fields can be fixed as follows: 90,000,000 bbl. from Baku fields, 60,000,000 bbl. from two Grozny fields, 30,000,000 bbl. from Maikop-Kuban fields and 20,000,000 bbl. from minor units. A most important tendency being noted already now is the development of oil reserves sufficient for individual industrial areas: thus Turkestan fields will supply all Central Asia; Emba fields will supply Lower Oural provinces; Oural fields will take care of the Oural-Volga area, while Saghalien will supply the Eastern Siberia.

Refining

The results achieved by the refining branch of the industry have been fairly good quantitatively. In the first half of 1929/30 operating year 47,500,000 bbl. of crude oil have been run, 100.9 per cent of the plan, the whole year's runs being indicated as 103,000,000 bbl. By main trusts the recovery of light products has been as follows during the first six months of the current year:

	AZNEFT bbl.	Per Cent Recovery	GROZNEFT bbl.	Per Cent Recovery
Gasoline	1,970,000	6.2	4,430,000	19.4
(Includes 41,000 bbl. from cracking)				
Kerosene	7,050,000	25.1	3,760,000	18.6

The cracked gasoline is still of minor importance, only two cracking installations being operated now; at this time 14 cracking units are nearing completion, and their number by 1932/33 is planned at 100. No hydrogenation plants are under consideration. If the most logical data available at this time will be considered for production, then the following recoveries of gasoline and kerosene may be expected in the next few years:

Year	Production Crude Oil bbl.	Gasoline bbl.	Kerosene bbl.
1929/30	120,000,000	12,800,000	22,000,000
1930/31	145,000,000	17,000,000	29,000,000
1931/32	170,000,000	24,000,000	32,000,000
1932/33	200,000,000	30,000,000	38,000,00

(To be continued in September WORLD PETROLEUM)

Current Russian Oil Production

Official Figures Specially Prepared for "World Petroleum" Concerning the Five-Year Plan and Results to Date. Internal Market Will Need 70,000,000 bbl. Gasoline and Kerosene by 1933

ACCORDING to recently revised figures of the R. S. S. R. five-year plan the production of crude oil during 1932-3 will amount to 294,000,000 bbl., representing the minimum to be extracted from the ground. This quantity is necessary to meet the demand for gasoline and illuminating oil. Revision was necessary because by 1933 the number of automobiles in service in Russia will reach 500,000, and tractors used for agriculture will be close upon 1,000,000. Hence Russia's internal market will need more than 70,000,000 bbl. of gasoline and kerosene combined.

Of the total production of crude 175,000,000 bbl. will be provided by the following oil trusts:

Azneft	105,000,000 bbl.
Grozneft and Embaneft	70,000,000 bbl.

The balance of which will be taken from new fields in the following amounts:

Sakahlin	7,000,000 bbl.
Ural	28,000,000 bbl.
Emba	21,000,000 bbl.
Central Asia	7,000,000 bbl.
All other fields	35,000,000 bbl.

Refining is making good progress, and the schedule for the 1932-33 year of operation in comparison with the 1928-29 year is as follows:

	1928–29 (Million Metric Tons)	1932–33 (Million Metric Tons)
Gasoline	1.0	12.2
Kerosene	2.4	6.4
Lubricating Oils	0.5	2.1
Fuel-oil	7.8	9.6

which in percentage to production represents the following:

Auto'bile fuel (gasoline)	1.4 per cent	6.9 per cent
Tractor fuel (kerosene)	3.3 per cent	39.4 per cent
Diesel Oil	9.9 per cent	8.7 per cent
Fuel-oil	61.8 per cent	23.5 per cent
Coke	.....	4.2 per cent
Other products	23.6 per cent	17.3 per cent
	100.0 per cent	100.0 per cent

The following table shows progress of the movement of petroleum in the U. S. S. R. for the past two years in comparison with the same as planned by the 5-year plan (in million tons):

	1928 to 1929	1929 to 1930	1930 to 1931	1931 to 1932	1932 to 1933
Sea transport to interior, via Astrakahn (total)	4.6	5.8	8.4	9.9	8.8
(Fuel-oil part of same)	3.0	3.8	4.3	2.8	0.2
Volga transport	4.6	5.6	7.6	9.5	10.3
Rail transport	9.9	12.5	15.6	19.5	25.3
Black Sea transport	0.4	0.7	1.0	1.3	2.0

At the end of 1929 the petroleum industries of U. S. S. R. were reorganized, and the "All Soviet Union Combine of Oil & Gas Industries" was formed, which is better known as the "Soyuzneft." This organization consists as follows:

1. AZNEFT—(Azerbaidjan Oil Trust—Baku)
2. GROZNEFT (Grozny Oil Trust — Grozny)
3. EMBANEFT
4. URALNEFT
5. SAKAHLINNEFT
6. GROUZNEFT (Georgia)
7. SRADAZNEFT (Central Asia)
8. NEFTERAZVEDKA (Dept. for Drilling Exploration)
9. NEFTESNAB (Dept. for Oil Industry Equipment)
10. SOYUSNEFTETORG (Sales Organization for Domestic Markets)
11. GIPRONEFT (Institute for Oil Industry Planning)
12. SOYUZNEFTEEXPORT (Export Sales Organization)
13. NEFTFLOT (Shipping & Marine Dept.)
14. NEFTESTROI (Construction Dept.)
15. NEFTEZAVODY (Dept. for Refineries & Plants in Central Regions)
16. RESEARCH INSTITUTE

The first three mentioned organizations are the oldest oil trusts of U. S. S. R., and have been in existence over ten years. Sakahlinneft is only three years old, but has very promising potentialities. Uralneft was organized last year for exploitation of the new discovered fields in the Ural mountains. Grouzneft has been created for exploring for petroleum in Georgia, the steppe of Shirak and the surrounding regions.

Neftezavody is devoted exclusively to refining oil in the central region, comprising the following four refining plants: Constantinovka near the city of Yaroslav on the Volga River, Varinsk and Bourmak near the town of Sormovo in the vicinity of Nizhny-Novgorod, and the plant at Leningrad named after Stepan Chaumian.

Neftetorg and Nefteexport are new units, organized for the sale of petroleum in the domestic and foreign markets.

For the first eight months of the current fiscal year, all the trusts combined effected 99.6 per cent of their scheduled production. Production of oil from Oct. 1st, 1929, to Jan. 1st, 1930, aggregated 74,900,000 bbl. and the production of gas was equivalent to 172,000 metric tons. Wildcat drilling was 15.2 per cent under its schedule. The greatest deficiency in general was shown by the Anzneft whose production was but 91.5 per cent of its quota. Most of the other trusts exceeded their drilling quotas, and nearly obtained their production quotas.

Anzneft, however, was the highest on the list in the refining production, being 100.1 per cent of its schedule. Grozneft was second with 99.4 per cent, and Embaneft was 99.6 per cent. The aggregate was 64,120,000 bbl. But the percentages of gasoline and kerosene were below schedule. Of the former, only 10.6 per cent was produced, instead of 11.2 per cent. The production of kerosene was 0.4 per cent below the program, of 14,470,400 bbl. The aggregate amount of gasoline refined was 6,858,600 bbl. The next fiscal year will show an increase.

The following figures show U. S. S. R. production for a number of years in proportion to wells in operation, giving the average in per cent.

Year	Output in 1000 tons (metric)	No. of Average wells in exploitation per day	Average daily production per well in tons (metric)	Per Cent: Output	Per Cent: Average No. of Wells	Per Cent: Daily output per well
1920/21	2457.3	777	8.6	.....	.....	.....
1921/22	2945.3	1098	7.2	+19.9	+41.3	−16.3
1922/23	3485.1	1437	6.5	+18.3	+30.9	− 9.7
1923/24	4124.8	1734	6.2	+18.4	+23.5	− 4.6
1924/25	4662.6	1907	6.6	+13.0	+ 7.5	+ 6.5
1925/26	5513.6	2287	6.4	+18.3	+19.9	− 3.0
1926/27	6809.7	2661	6.9	+23.5	+16.4	+ 7.8
1927/28	7573.8	2905	7.0	+11.2	+ 9.2	+ 1.4
1928/29	8683.4	3143	7.5	+14.7	+ 8.2	+ 7.1

French Refined Product Licenses Granted

(By cable from our Paris Correspondent)

TEN new licenses to import refined petroleum products into France were authorized by the Minister of Commerce on August 1st. The licenses permit a total of 232,640 tons (about 1,628,480 bbl.) proportioned as follows:

Company	Tons	Product
Comptoir Syndical de Distribution Huiles et Graisses Industrielles Cosyndis	65,000	lube. oil
Oil Francaise	8,000	gasolene
Petroles du Languedoc	24,000	gasolene
Petroles du Languedoc	1,000	kerosene & white spirit
Redeventza	11,000	gasolene
Redeventza	1,005	gasoil
Huiles Goudrons et Derives	12,000	gasolene
Huiles Goudrons et Derives	5,000	gasoil
Carburants et Produits de Synthese	12,000	gasolene
Carburants et Produits de Synthese	5,000	gasoil
Raffinerie de Petrole Dela Gironde	32,000	gasolene
Petronaphte	20,000	lube. oil
Petronaphte	15,000	gasoil
Union des Importateurs de Carburants du Nord de la France Unican	16,000	gasolene
Nord de la France Unican	500	gasoil
Nord de la France Unican	250	kerosene & white spirit
Economique	2,390	lube. oil

The general outlook is unchanged by these new import authorizations as they do not even equal the increased French consumption.

E. J. ANDRÉ.

Resources of Great Oil Companies in the U. S. A.

PRODUCTION

Company	*Bbl. Annually*
Royal Dutch-Shell (World)*	175,992,000
Standard Oil Co. of N. J.	101,100,000
Gulf Oil Corporation	100,000,000
Standard Oil Co. of Ind.	89,425,000
Standard Oil Co. of N. Y. and Vacuum Oil Co.	57,986,392
Standard Oil Co. of Cal.	51,534,000
Texas Company	50,675,300

REFINERY CAPACITY

Company	*Bbl. Annually*
Shell Oil Co. (U. S.)	704,200
Standard Oil Co. of N. J.	718,000
Standard Oil Co. of Ind.	704,500
Standard Oil Co. of N. Y. and Vacuum Oil Co.	263,000
Standard Oil Co. of Cal.	244,700
Texas Company	232,800
Gulf Oil Corporation	177,000

*Not including associated companies.

The foregoing figures were quoted by Harold F. Sheets, director of the Vacuum Oil Company in his recent testimony before Special Master Fred W. Williams in New York in connection with the merger.

Oil Price Structure and the Future

Factors Changing the Balance of Prices of Petroleum Products. Possibilities of Hydrogenation Upsetting Market Structure . .

By M. David Gould

Manager, Statistical Department, A. M. Lamport & Co. Inc.

FOR MANY years the price of gasoline has been the determining factor in the profits of the oil industry. When gasoline prices are high, profits are good; when they are low, profits are poor and deficits begin to appear in the income accounts of the smaller and weaker companies. Mere volume of output is not the determining factor, as volume has shown steady increase year after year while earnings of oil companies have shown wide fluctuations. Neither are the price and volume of production of crude oil determining factors.

In an ideally integrated company producing its full requirements of crude, but no more than its requirements, the price of crude oil would be merely an interdepartmental bookkeeping item between its producing and refining departments. Should the price of crude oil advance without corresponding advance in gasoline prices, the producing department would gain as much as the refining department lost by the higher cost of its raw material, and there would be no net change in the profits of the company.

Obviously the same holds true with the oil industry as a whole except for net changes in stocks of crude on hand, which have never in recent years amounted to more than 101 per cent of the year's production, except for 1923.

The production of the various refined products last year in barrels and in percentages of throughput of crude oil were as follows:

Production of Refined Oil Products by Commodities, 1929, in Thousands of Barrels

		Percentage
Run to stills—Domestic	1,106,952	
Foreign	84,787	
Re-run	62,375	
Total	1,254,114	
Natural Gasoline	58,363	4.6
Gasoline	528,062	42.1
Kerosene	72,339	5.3
Gas and Fuel Oil	527,618	42.0
Lubricants	42,567	3.4
Wax (lb.)	760,275	2.8
Coke (tons)	2,323,100	Equivalent
Asphalt (tons)	4,049,200	
Other Finished Products	12,415	1.0
Unfinished Oil Produced	48,225	3.8
Loss	44,388	2.5

On the other hand, in dollar values, the respective products contributed in widely varying amounts to the total gross revenues of the industry, and the percentages of dollar values to total vary widely from the percentages of volume. It will be seen at once that gasoline and lubricating oil contribute far more than their share to the revenues of the industry, while fuel, just as conspicuously, contributes less than its proportion.

Factors Determining Gasoline Demand

The basic reason for this state of affairs is not hard to seek. The demand for gasoline depends fundamentally on the number of automobiles in use, their average mileage per year, and the average consumption per mile; by far the most important is the number of automobiles.

Except possibly in the early days of the automobile industry, there has never been a year when retirements of motor cars from active use were not substantially exceeded by new registrations. The total number of cars in use, and the total consumption of gasoline, has, therefore, shown a steady increase. Furthermore, gasoline is not competitive in its field, with two minor exceptions. Benzol and ethyl-alcohol can both be used as motor fuel, and are so used in certain European countries. They both have anti-knock qualities and are especially adapted for use in the modern high-compression automobile engines. The available supply, at prices competitive with gasoline, is, however, strictly limited; last year in the United States benzol production amounted to less than three-tenths of one per cent of domestic crude production, and the use of alcohol was negligible, although it finds some utilization for this purpose in Europe, and may develop in Brazil.

Similarly, petroleum-base lubricants have practically driven from the market, except for a few special uses, the older lubricating oils derived from animal or vegetable organisms. In fact, the most modern machinery with its heavy masses and high speeds is unthinkable without petroleum lubricant.

Consumption of the lubricating oils is dependent first, on the increasing amount of the machinery in use with the progress of industrial technique, and second, on the rate of industrial activity as affected by general business conditions. Increased consumption of lubricating oil, while not as spectacular as that of gasoline, has, therefore, been steady and cumulative, its setbacks in times of depression being relatively minor.

Conditions Have Radically Changed

Before the popularization of the automobile, of course, gasoline was of relatively minor importance if not, actually, a dangerous and worthless by-product. For the first forty years of the industry in this country, the lighter fractions of petroleum installation were burned or often secretly dumped into creeks. Various State Legislatures passed laws requiring inspection of all kerosene sold for domestic use with a view to seeing that it did not contain too much gasoline which would be reflected in a low flash point.

The basis of the whole industry was the domestic consumption of kerosene for heat and light and the first great revolution came when it was forced to switch over from the domestic cooking and lighting field, which was won by gas and electricity into the new field of supplying fuel for the automobile. In 1900 the percentage of kerosene extracted from crude oil was 38 per cent; last year it was 6 per cent.

Increasing Outlets for Fuel Oil

With the increasing use of gasoline, came to an increasing extent the problem of the disposal of fuel-oil produced as an inseparable by-product in refining. In other words, with the increasing amount of gasoline produced, for which a steady market was supplied by an expanding number of automotive vehicles, it became necessary to find correspondingly large markets, which did not grow up of their own accord, for the fuel-oil produced in conjunction with the gasoline. The difference was that for years, the problem of the refiner, with respect to gasoline, was to find means of making enough to meet an increasing demand; in the case of fuel oil, he had to find outlets for an increasing supply.

Such outlets were found in the use of fuel-oil under boilers, in steamships, and in industrial installations. Following the

war, the problem became increasingly acute with the development of a number of heavy-oil fields, particularly in Mexico and California, whose outputs were low in gasoline content and high in fuel oil. The development of oil burners for house heating, favored by the recurrent coal strikes from 1919 to 1924, afforded a future outlet. The steadily increasing use of manufactured gas provided additional demand for the lighter fractions of the fuel oil in the form of gas-oil.

In the past ten years the Diesel engine, which has been gradually winning its way into industrial favor for the past thirty-five years, has made great strides. It has greater thermo efficiency than the steam boiler or the gasoline engine and is capable of extremely economical operation under uniform load, it can work on a higher-compression ratio than the carbureting type of internal-compression engine, and its speed and range of high and low revolutions have been increased materially.

On the other hand, it is not so suitable as yet for uses demanding wide variations in speed, its fuel injecting mechanism is delicate, piston and piston rings must fit tightly because of the high pressure under which it operates and dangers of possible warping of valves and breakdown of cylinder lubrication are ever present.

Effects of Increasing Use of Diesel Engine

The use of the Diesel engines, however, has shown a steady increase and this prime mover is now used for such widely different purposes as electric power generation, pumping, excavation, artificial ice manufacture, mining, quarrying, and in cottonseed oil mills, textile plants, dairies, packing plants, and many other industrial installations. Packard, Beardmore and Junkers have made great steps forward in launching Diesel engines for aviation, having reduced the rate down to below three pounds of engine per horse power. Over half the tonnage of shipping now under construction is Diesel equipped.

Persistent efforts are being made to increase the utilization of Diesel engines in the field of railroad equipment, which is estimated to have a capacity of 130,000,000 h.p. and the more imaginative even permit themselves to visualize the utilization of Diesel engines in the automotive field whose combined powers exceed 400,000,000 h.p. Its extensive use for busses and trucks, whose owners can buy fuel oil in bulk, is very close at hand.

Fuel Oil Finding Non-Competitive Market

The importance of this development is that for the first time fuel-oil is finding a market, which is natural to it and which it can serve on somewhat the same basis as gasoline serves the carbureting type of automotive internal combustion engine.

All other markets for fuel oil are directly competitive with coal and to some extent with manufactured and with natural gas. Undoubtedly, fuel oil has certain natural advantages such as ease of handling, saving in labor costs, cleanliness, saving in storage space, but under present conditions, these advantages are being given away to consumer and fuel oil competes with coal purely on a price basis.

While in this article both boiler and Diesel oils are quoted under the one term of fuel oil, not all grades of fuel oil are entirely suitable for use in Diesels, even of the stationary or marine type. For Diesels to be used for aviation, or even ultimately automotive engines, it is estimated that not more than 5% or 10% of the available crude will yield a suitable type of Diesel oil, and then only in part at the expense of the lighter fractions.

Summing up, from the standpoint of demand, we see that fuel oil relatively to the other refined products is being improved by the development of fields in which competition with other fuels is not as keen as in such typical large scale uses as house heating, or industrial installations.

From the standpoint of supply, the situation of fuel oil is likewise improving. The development of cracking processes in the past fifteen years is largely responsible for the increased yield of gasoline per barrel of crude, although increased utilization of certain fractions that formerly went into kerosene or naphtha has also helped, together with increasing recovery of natural gasoline from casinghead gas.

At the present time, less than a barrel of fuel oil is produced for each barrel of gasoline; not long ago two or three barrels of fuel oil to each barrel of gasoline was the usual ratio. Thus the supply of fuel oil has not increased as fast as the production of either gasoline or crude oil.

Opening Fresh Outlets

In the past, fuel oil has been the great stabilizer of the oil markets. The selfsame competitive situation with respect to other fuels, whose unfavorable side we have seen before has proved of great advantage in previous periods of overproduction of crude and gasoline. At such periods crude and refined products were declined to unprofitably low figures. The lower price of gasoline would have no appreciable effect in increasing consumption, this being, as we have seen, dependent on the number and use of automotive vehicles. On the other hand, a radical cut in the price of fuel oil would enable it to compete more effectively in certain markets on a price basis and, thereby, open fresh outlets which would pave the way for the elimination of excess stocks and ultimately to a recovery in the general oil situation.

The advent of cracking has not changed this situation except that it has increased the flexibility of the relation between crude oil and fuel oil. With the cracking process it becomes possible to increase the yield of gasoline within definite limits in accordance with market conditions, and thereby decrease the yield of fuel oil.

Possible Effects of Hydrogenation on Price Structure

With hydrogenation now on the horizon as a complement, if not ultimately a substitute for present day cracking process, the affect on the fuel oil-gasoline relation may be profound. It might be desirable to say, at this point, that the existing uncertainty as to costs and yields under hydrogenation, any attempt to draw economic conclusions from the known possibilities of the process should be considered extremely tentative.

Assuming, however, a sufficiently wide

Table B. U. S. Gasoline Production in Thousands of Barrels

Year	Straight-run	Cracked	Natural	Total	Percent of Through-Put.
1919	81,288	*10,000	2,957	94,235	25.9
1920	98,098	*15,000	3,152	116,251	26.6
1921	100,187	*20,000	2,517	122,704	27.5
1922	114,010	*30,000	3,662	147,672	28.4
1923	139,416	*35,000	5,487	179,903	30.4
1924	160,654	*40,000	12,671	213,325	31.7
1925	171,383	68,582	19,636	259,601	32.5
1926	178,319	93,736	24,399	299,734	35.3
1927	179,282	101,224	32,161	330,667	36.7
1928	219,168	122,554	42,300	384,022	41.7
1929	245,019	143,759	52,265	442,024	46.7

* Estimated.

Table C. U. S. Consumption and Exports in Thousands of Barrels

Year	Gasoline	Kerosene	Gas & Fuel Oil	Lubricating Oil	Total
†1899	6,679	29,966	7,227	4,745	48,618
†1904	6,954	32,318	8,564	7,503	55,339
†1909	12,848	39,894	40,515	12,775	106,032
†1914	34,748	46,063	88,184	12,337	181,332
1919	90,629	56,539	177,719	20,148	345,034
1920	116,461	53,912	205,692	24,302	400,367
1921	120,194	47,377	215,788	18,943	402,303
1922	141,693	56,173	256,595	23,433	477,895
1923	177,025	55,224	290,649	25,586	548,485
1924	213,378	62,183	326,838	27,157	629,557
1925	355,317	61,174	342,297	30,295	689,083
1926	305,140	60,371	375,913	31,974	773,318
1927	342,370	57,086	388,871	31,426	819,753
1928	381,729	59,074	*414,500	34,192	899,495
1929	433,060	57,324	*447,894	34,369	972,647

† Production and Consumption data are not available.

* Estimated.

Table D. Dollar Value of Four Major Refined Products at U. S. Refineries in Millions.

Year	Gasoline	Kerosene	Gas & Fuel Oils	Lubricating Oils	Total of Four Products
1819	16	75	8	13	112
1904	21	91	9	24	145
1909	40	96	36	39	210
1914	122	97	84	56	359
1919	766	236	318	196	1,516
1921	881	152	377	195	1,605
1923	930	147	346	204	1,627
1925	1,269	162	490	252	2,172
1927	1,022	148	457	246	1,873
1929	0,000	000	000	000	0,000

Table E. Average Annual Prices of Crude and Refined Products

	1923	1924	1925	1926	1927	1928	1929
Oklahoma Crude 36° A.P.I., per bbl.	$1.56	$1.63	$1.87	$2.13	$1.38	$1.31	$1.37
Mid-continent U.S. Gasoline, Cents per gal.	9.78	8.96	10.55	10.31	6.67	7.95	7.75
Mid-continent Kerosene water-white, cents per gal	4.00	4.49	4.45	7.27	4.61	5.17	5.17
Mid-continent Fuel Oil 24-26 per bbl.	0.9511	0.954	1.0908	1.3072	0.9792	0.7694	0.70
Mid-continent Gas Oil 32-36, cents per gal.	2.66	2.91	3.68	4.19	2.99	2.47	2.65

use of hydrogenation to make its practices and yield ratios standard in the industry, a yield of 100% of gasoline per barrel of crude with practical elimination of the fuel oil residue would be, first, a sharp diminution in the supply of fuel oil as a residue from gasoline refining.

On the other hand, since such refineries would need less than half their present throughput of crude to manufacture a given quantity of gasoline, the problem of overproduction—acute enough as things are—would be even more intensified. It seems difficult to conceive of the United States going on a basis of 1,300,000 bbl. of crude oil production a day, with shut-in production of possibly four to six times that amount.

Unquestionably, the gap in fuel oil supplies caused by the elimination of fuel oil residues from gasoline refining plants, due to their adoption of hydrogenation methods, would be speedily felt by a higher yield of fuel oil than the present average from other plants not using hydrogenation which would utilize surplus above the minimum of 1,300,000 barrels a day based on 100% installation of hydrogenation processes for the full gasoline requirements of the country.

These speculations may take us too far afield; we cannot say as yet definitely whether hydrogenation inaugurates a revolution in the American oil business of even greater importance than the development of cracking, or if its high cost method is more suitable to European conditions were high prices and limited markets for gasoline prevail. American test plants are about ready.

In conclusion, we find that gasoline and lubricants today bear the major load of the American oil industry, and their prices largely determine its prosperity. Fuel oil which bulks nearly as large as gasoline in volume is becoming steadily more fitted to assume its share of the burden because of increasing demand and a tendency toward relative decrease in supply. Hydrogenation may bring about serious changes in the whole price structure depending on how widely it is introduced into world-wide refining practice, particularly in America.

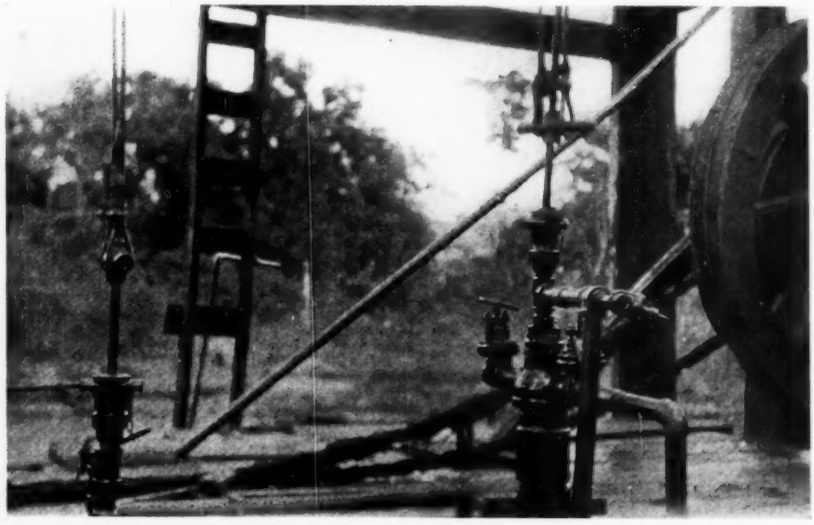
One of the Trinidad Leaseholds Ltd.'s new American-built refineries.

Trinidad Petroleum Review

JUDGING from his annual report submitted to the British Colonial Secretary, A. P. Catherall, Inspector of Mines at Trinidad, B. W. I., anticipates that oil production in that section of the British Empire will greatly exceed that from any other part. The production for 1929 was 8,715,672 bbl. compared with about 8,300,000 bbl. from British India. The report gives a complete resume of oil and refining in Trinidad for the year of 1920. Royalty received from oil from crown lands amounted to £74,937. Five new oil prospecting licenses were granted during 1929.

Since 1921 there has been an almost steady decrease of the number of oil companies operating in the Colony. In 1929 there were 15 companies compared with 26 in 1921, and with 12 in 1911-12. But, production has steadily increased. Last year 150 new wells were started, making the total number of wells drilled 1610 up to the end of December last. Of these wells 1009 are on crown lands. Of the wells drilled last year 43 were dry, or virtually dry. In one well sulphuretted hydrogen gas was encountered, and one of the crew was fatally overcome. There were only two other fatal accidents during the year, although last year the maximum number of persons employed in the oil industry of the Colony was 5402, and 5369 on December 31. No serious oil fires occurred last year. Incidentally, in 1925, as many as 1980 people were employed in the Trinidad Natural Asphalt industry, but only 888 in 1929.

The growth of Trinidad's oil production is very clearly shown in the report. From 1905 to March 31, 1910, the total production was only 10,541 bbl., increasing to 8,715,652 bbl. in 1929. The aggregate production to date was 54,870,600 bbl. Of this quantity 41,608,626 bbl. was refined in Trinidad. Altogether, 42,440,132 bbl. of crude and refined oils have been exported. The total footage drilled in the last 18 years has been 307,334 ft.



A 600 ft. well and a 3,000 ft. well side by side and pumping off the same beam on the Apex Co.'s field, Trinidad.

Oil Production Problem in India

Chief Producing Company Faces Serious Drilling Difficulties Plus Marketing Obstacles and Increased Government Excise Duties. Engineers Visit America for Assistance

LAST YEAR the production of crude petroleum in British India, including Punjaub, Burma and Assam, amounted to 8,286,000 bbl., or a drop of 14,000 bbl. from the 1928 output, although recent U. S. Government figures give India's production as 8,470,000 and 8,741,000 bbls. for 1929 and 1928 respectively. This production in India represents about 0.6 per cent of the world's total. For the first six months of the current year production has fallen to approximately 3,600,000 bbl., and it looks very doubtful if the steady decline will be reversed before next year at the earliest, if at all.

Difficulties on all sides have been encountered by the principal producing company in India proper—the Attock Oil Co., Ltd. All branches of its business have met with obstacles that not only have been serious financially, but have held back production and refining. Fortunately by judicious conservation of its funds the company is in a reasonably strong cash position. In the earlier part of 1929 drilling in the 3600-3800 ft. zone at the Khaur field in the Attock district, Punjaub, indicated good prospects, but later in the year it was found that this zone was pocketty. Recently the services of an expert geological consultant were called in, and after examination he reported that the oil obtained so far has been fissure oil which has migrated up from the mother rock, but offers excellent prospects for stable production once the parent reservoir below has been tapped.

As the company's geologists concurred with the expert's opinion, it was decided to carry out deep drilling of such wells as did not at present give paying production at 3600-3800 ft. Trouble was immediately encountered due to caving and to the drilling strings becoming struck, necessitating fishing. In one well oil was struck at 4898 ft., and flowed at the rate of 750 barrels per day, but a violent upheaval occurred, and the casing was plugged to within 1000 ft. of the surface. Owing to the heavy pressure repeated attempts to clean out the well have proved unavailing. Most careful precautions are being taken in drilling deeper, but it has been decided that the biggest number of deep wells which can be drilled efficiently at one time is three. Consequently a curtailment of the drilling program has been made, and the staff reduced by one-third, and the entire energies at Khaur are concentrated on deep drilling. Meanwhile the total production is down to about 500 bbl. a day, and the company is virtually back on a semi-prospecting basis. Production for June was 16,009 bbl., showing an increase of 1203 bbl. over May, which is an encouraging sign.

Rigs and Collecting Tanks, Yenangyung Field Burma.

General view of the Yenangyung field, Irrawaddy River, Burma.

In order to leave no stone upturned in obtaining a satisfactory way out of the drilling difficulties, two members of the Attock staff have been sent to the United States to make studies and to secure expert assistance.

When the consulting geologist visited the Khaur field, he also examined the structural conditions of the Dulian and other fields. While his report is favorable, the field is deep, and consequently expensive to drill, so operations will be postponed until gas supplies from Khaur are adequate to provide the necessary fuel. On the other hand the Khaire Murat area, to be tested in September-October next is likely to prove a shallow field. The road to the site of the first wildcat has been completed, and the start of the drilling awaits the favorable weather conditions of the Fall.

The company's refinery at Rawalpindi, connected with the field by a 42-mile pipe line, has reduced its operating costs to a point of excellent efficiency; but its daily run is only about 500 bbl. per day, whereas

it is capable of handling about 2000 bbls.

Owing to the largest petroleum distributing company in India deciding to give the public the full benefit of freight savings produced from its new bulk distributing system, up country prices of kerosene in the area marketed by the Attock Company, were reduced to one anna per gallon, which had to be met. Right on top of this the Indian government decided to increase the Excise duty on kerosene by six pies per gallon, simultaneously reducing the import duty on the same refined oil by three pies per gallon, thereby reducing the protection previously enjoyed by 50 per cent.

Refineries in British India produce about 63,000,000 gal. of gasoline annually which, according to one report, is about the amount of the internal consumption. The Indian Tariff Board gives 47,-141,482 gal. as the gasoline consumption for 1927, while the official estimates for 1928-1929 are about 60,000,000 gal. per year. Burma, of course, is by far the largest producer of petroleum in British India. The output is approximately 7,500,-000 bbls. from nearly 2000 wells, while Assam produces less than 900,000 bbls. The Burma Oil Company is the biggest producing company in Burma.

There are three oil fields in Assam, namely Badarpur, Digboi and Masumpur, which produced 683,987 bbl., 65,000 bbl. and 160 bbl., respectively, in 1928. There are also several islands off the Arakan coast known to contain oil deposits. This coast runs from the mouth of the Brahmaputra to the mouth of the Irrawaddy. Way back in 1911 a production of 790 bbl. was obtained from Ramri Island, and 500 bbl. from Eastern Barongo Island near Akyab. These islands and the Assamese fields are supposed to be part of the Burma field, which also extends to the productive fields of Sumatra, Java and Borneo. On the other hand the Attock Island field belongs to the Western area, which includes the Punjaub, Baluchistan and on to the Persian oil fields.

Having a very dense rural population, three times as large as that in the United States, and averaging 177 to the square mile, India is a natural market for kerosene so the consumption of this form of refined product is far greater than that of gasoline, although the latter is steadily growing. Kerosene is used principally for lighting in rural districts where conditions are not very favorable for the development of electrical illumination. About 90 per cent of the population live in rural communities. In India proper over 147,-000,000 gal. of kerosene are annually imported from the refineries of Burma, and approximately 84,000,000 gal. from other countries. The balance of the kerosene consumed being produced in Punjaub and Assam. This is about 1,500,000 gal.

Part of the river transportation system of the Burma Oil Company.

A considerable quantity of American oil well and refinery machinery is imported annually into India, the average value for the last four years amounting to $795,649.

According to the Petroleum Division of the U. S. Department of Commerce, the Director of Geological survey of India believes that there is likely to be a slow and steady decline in output during the present generation unless new oil fields of importance are discovered, so that as time goes on imports of kerosene will increase. Unless deep drilling at the Khaur field proves exceptionally successful or unless the new fields at Dulian and Khaire Murat prove out well, India proper is going to rely more and more upon sources outside of the country.

As in Burma the policy of the biggest producer, the Burma Oil Company, is to make the best use of known deposits of oil rather than wildcat for new fields, it looks as if the hydrogenation process would prove of great value in increasing the quantity of refined products. But no statement has been issued as to whether or not this is being considered.

Canadian Oil Tariff Improbable

PRODUCTION and refining of petroleum in Canada has not reached the stage where an import tax would be a wise or economical procedure, and this no doubt will have its influence with the new conservative government, reported to be strongly in favor of a tariff wall. Production of crude oil in the Dominion has only recently reached the million barrel stage, whereas the total imports of crude and various refined products from the United States alone totaled 30,876,488 bbl. last year, without including imports from South America. The imposition of a tax naturally would be borne by the Canadian people, as it will be many years before internal production can fully meet consumption, and by then requirements will have increased. Last year imports from the United States into Canada were as follows:

	Bbl.
Crude	22,412,181
Gasoline	5,193,028
Kerosene	102,343
Lubes	546,836
Transform	14,607
Light oil	4,605
Fuel oil	2,125,648
Grease	23,380
Ref. wax	4,081
Un. ref. wax	4,855
Asphalt	298,242
Petr. coke	142,429
Residue	4,253
Total	30,876,488

The new American oil refining colony on the island of Aruba, D. W. I., where nearly 3000 people are fed from the U. S. A.

Refinery Cooling Tower Design

Practical Considerations Involved in Constructing Water Coolers to Give the Greatest All-Round Efficiency . .

By Hugh R. Lamberth

THE solution to practically every engineering problem involves a compromise or balance between two or more conflicting factors. In the design of water cooling equipment such a compromise is inevitable.

From the designer's standpoint the foremost problem is that of balancing cooling performance against windage or spray loss from the system. Although a great many other factors have to be cared for, the operating satisfaction to the user usually hinges on these two.

It is assumed that the user wishes to save as much water as possible, otherwise he would not contemplate recirculation over a tower. This, however, must be accomplished without the nuisance created from water spray drifting over the area near the tower. At the same time, a maximum amount of cooling must be effected to warrant recirculation.

If a tower is designed to absolutely prevent spray at high wind velocities, it is certain that such a tower will be most inefficient at normal wind velocities. Spray loss in an atmospheric tower cannot be entirely eliminated without unreasonable disregard of performance efficiency and first cost.

After providing louvers and baffles to reduce spray to a minimum, there is then the problem of securing efficient performance. This end is primarily dependent upon

(1) Distribution
(2) Subdivision
(3) Air flow

Distribution must not only be good at the designed load, but must be sustained through a wide variation of operating conditions with as little adjustment as possible.

Decking must be so designed as to provide maximum surface consistent with air flow and to assure equal distribution at all points, and to counteract drifting due to cross winds. So much for the designer's problem.

The user's problem is one of (1) foreseeing conditions, (2) selection of optimum operating conditions, (3) economical purchase, (4) operating economy after installation.

There are unquestionably a great many towers installed that are not particularly suited to the service intended. Too large a tower is decidedly preferable to one that is too small, but either installation may be costly, either in reduced plant production, maintenance, or first cost.

Specifications are oftentimes not representative of conditions pertaining. This may be attributed to the impossibility of foreseeing future conditions, but in the majority of cases to unfamiliarity with the engineering and economics surrounding requirements and conditions governing design and performance characteristic of cooling systems.

The purpose of this paper will be to (1) show concretely how the variables entering the problem will affect design and operation, and (2) present data which will enable one to predict performance under various conditions, and (3) provide means of correlating performance actually obtained with specified performance.

Referring now to Figures I and II, we find Figure I is a series of performance curves based on three arguments: (1) temperature drop of water, (2) approach to wet bulb temperature, and (3) gallons per minute per 6-foot section.

This assumes an average efficient 10-deck tower 35 feet high and 12-foot-wide decks (inside louvers). Thus a single deck provides a cross sectional area of $6 \times 12 = 72$ square feet. Good distribution is assumed from top to bottom. Under the conditions of 65° F. wet bulb temperature and 5 miles per hour wind velocity broadside to tower, the capacity figures will vary through only a small range plus or minus, depending upon design features.

Figure II gives performance factors for variations in (1) wet bulb temperature, (2) wind velocity, and (3) height of tower from conditions given in Figure I.

The height factor assumes a full deck every 2 feet, 6 inches of height change. The width of the tower (not shown) will vary the capacity in direct proportion to

Cooling tower 48 ft. high and 840 ft. long recently erected in an American refinery.

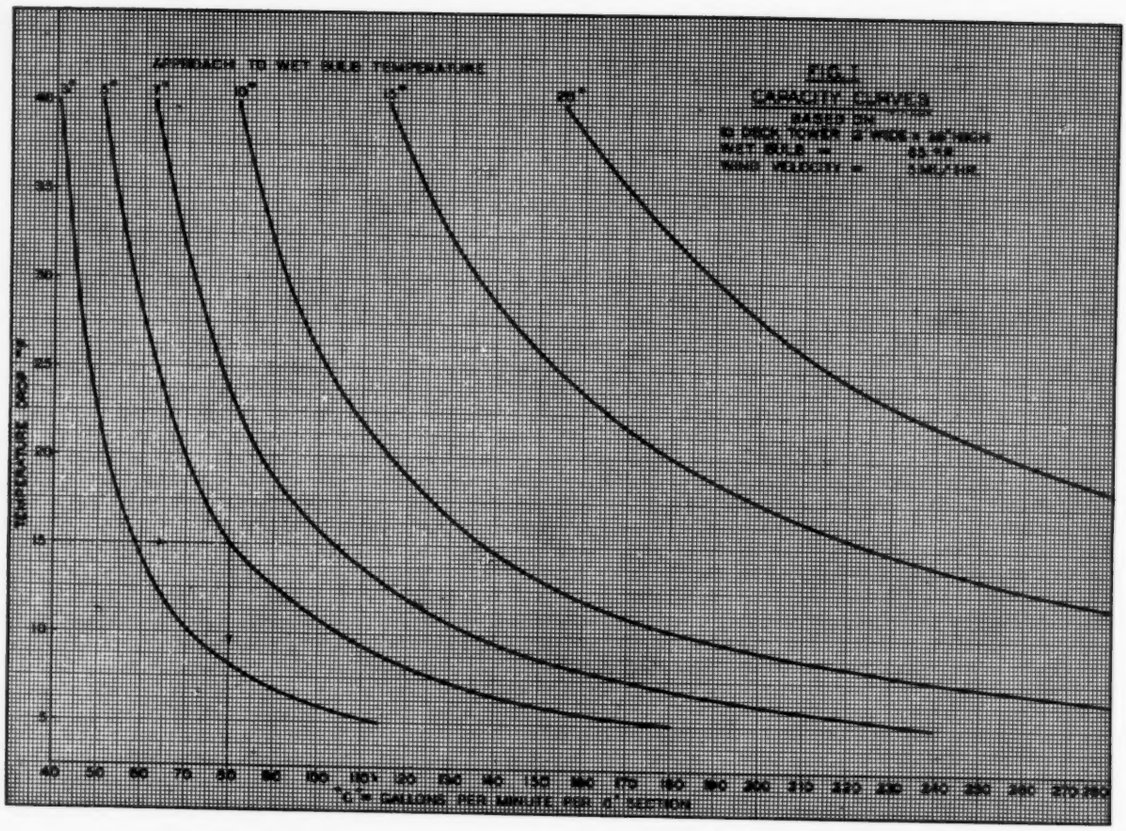


Figure 1
Capacity Curves

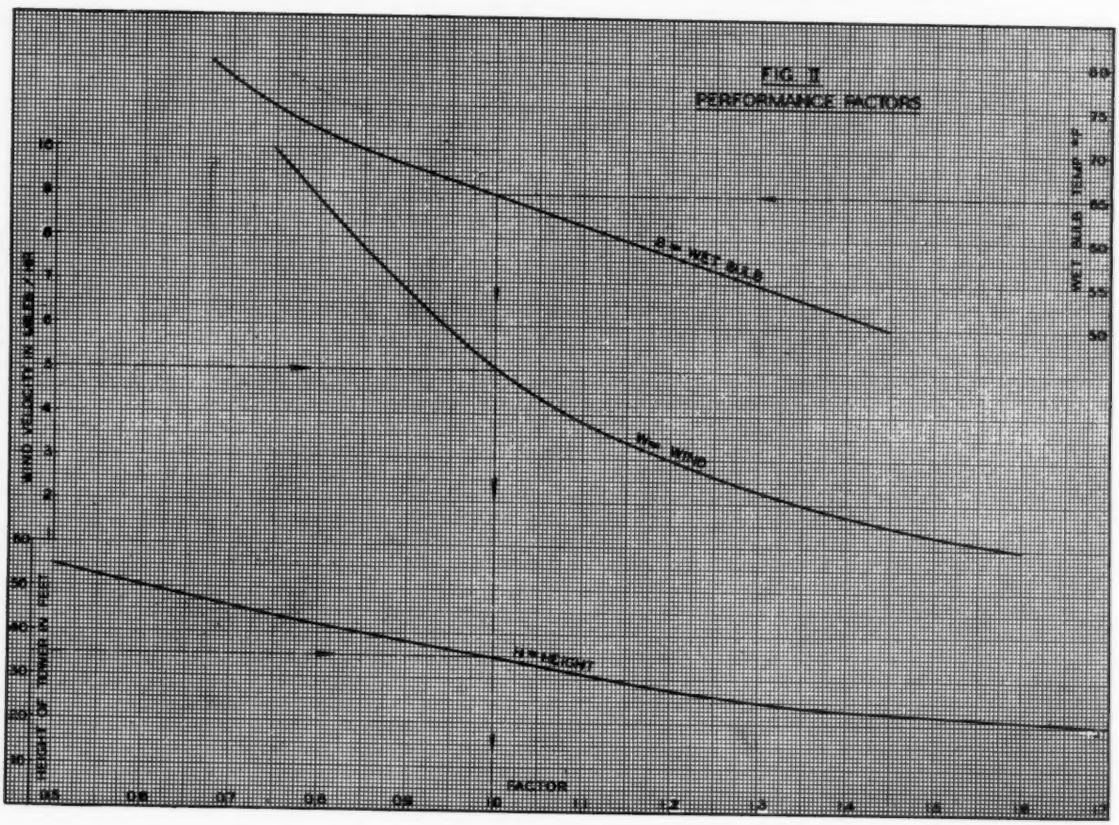


Figure 2
Performance Curves

change in width to less than 12 feet. The efficiency per square foot of deck surface increases slightly with decreases in width from 12 feet. Increases of width from 12 feet are uneconomical, as the efficiency per square foot falls off rapidly at low wind velocities.

To determine the size of tower required, the following formula applies:

$$L = \frac{Q \times B \times W \times H}{C}$$

where

L = number of six-foot sections required
Q = total quantity of water to be circulated
B = wet bulb factor
W = wind velocity factor
H = height factor
C = gallons per minute per six-foot section

For purposes of discussion let us assume that we have a cooling tower to install capable of dissipating 7,500,000 B.T.U./hour. Other conditions throughout the plant have indicated that a minimum water circulation of 750 G.P.M. is necessary, and that it will not be economical or desirable to circulate more than 1500 G.P.M.

Considering the tower alone, we have a series of possibilities, representative of which are:

(A) 750 G.P.M. through temperature range of B.T.U./hour

$$\frac{\text{B.T.U./hour}}{\text{G.P.M.} \times \text{minutes/hour} \times \text{pounds water/gallon}} =$$

$$\frac{7{,}500{,}000}{750 \times 60 \times 8.33} = 20^\circ \text{ F.}$$

Similarly,

(B) 1000 G.P.M. through 15° F.
(C) 1250 G.P.M. through 12° F.
(D) 1500 G.P.M. through 10° F.

Others conditions are:

(1) wet bulb = 65° F.
(2) wind velocity = 5 miles/hour
(3) approach to wet bulb = 5° F.

Substituting information from Figures I and II in the formula,

$$L = \frac{Q \times B \times W \times H}{C}$$

we obtain:

(A)
$$L = \frac{750 \times 1.0 \times 1.0 \times 1.0}{70} = 10.7 \text{ sections}$$

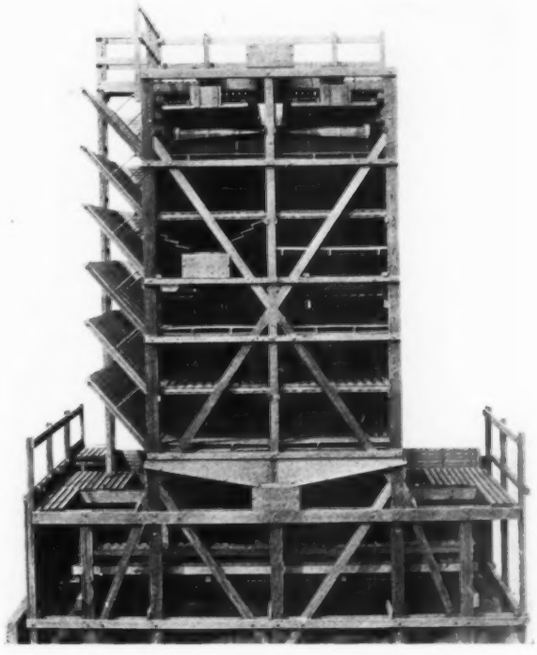
(B)
$$L = \frac{1000 \times 1.0 \times 1.0 \times 1.0}{80} = 12.5 \text{ sections}$$

(C)
$$L = \frac{1250 \times 1.0 \times 1.0 \times 1.0}{94} = 13.3 \text{ sections}$$

(D)
$$L = \frac{1500 \times 1.0 \times 1.0 \times 1.0}{105} = 14.3 \text{ sections}$$

From these selections we see that for the same thermal capacity, other conditions being equal, less tower is required to cool a smaller amount of water through a larger temperature range. This angle should also be considered from the standpoint of pumping economy.

Let us take the 1000 G.P.M. selection and check into other possible selections.



Cross section of atmospheric tower with wide base for cooling coils. Note collecting and redistributing system half way up

Other conditions remaining unchanged, we feel that we can (1) safely assume a 7-mile/ hour wind velocity, or (2) let the final water temperature approach the wet bulb 10° F. instead of 5° F.

Then (1)
$$L = \frac{1000 \times 1.0 \times 0.9 \times 1.0}{80} = 11.2 \text{ sections}$$

Or (2)
$$L = \frac{1000 \times 1.0 \times 1.0 \times 1.0}{138} = 7.3 \text{ sections}$$

Thus small variations in assumed conditions may make considerable difference in tower selections.

Assume that we have installed the 13-section tower (to nearest whole section) computed in (B) to cool 1000 G.P.M. from 85° F. to 70° F. with a 65° F. wet bulb temperature and a 5-mile/hour wind velocity. We wish to predict the performance of this tower when circulating 1200 G.P.M.

Then
$$C = \frac{1200}{13} = 92.5 \text{ G.P.M./section}$$

From inspection we find that, entering Figure I with C = 92.5, we can cool this amount through 12° F. with a 5° F. approach, or 18° F. with a 7° F. approach, etc.

With this information at hand, one can predict performance under any normal conditions, assumed or real.

It is recommended that the circulation per square foot of deck surface not exceed 3.5 gallons per minute per square foot. Heavy water concentrations tend to blanket air circulation and prevent proper subdivision of water. If this figure is exceeded in a selection, a longer and lower tower should be used.

The following suggestions may be useful to those contemplating tower installations:

(1) Determine best location possible, with respect to exposure, pumping conditions, pipe work, soil bearing spray, property value, future extension.

(2) Determine optimum water circulation and desired temperature range, bearing in mind possible future conditions.

(3) Atmospheric conditions to be expected. What are variations from normal conditions, how long do they last, and what effect will they have on tower performance? Would a variation of several degrees in your specified performance affect your plant production?

(4) What design condition will afford the best operating range for your particular service?

(5) Fixed pumping requirements.

Oil Possibilities in The Guianas

Review of Attempts to Find Petroleum. No Substantial Wildcatting Yet Completed. Only Traces of Deposits Yet Found

By D. M. Veysey

REPORTS of petroleum activities in the Guianas continue to suggest possibilities, but without immediate prospects of production. Shallow test wells drilled in Dutch Guiana and traces of petroleum incidental to the drilling of artesian wells in British Guiana are, up to the present time, the only definite indications upon which discussion may be based. Should oil be found in extensive quantities, the close proximity of the Guianas to the numerous refineries in the Caribbean places production in an advantageous position in international oil affairs.

The successful foreign producing companies of Venezuela have considered the possibilities of oil in the northern part of British and Dutch Guiana, where an alluvial "bay" has been laid down by the great rivers of that region, for some distance inland. Farther from the coast these countries appear to be homogeneous with that portion of Venezuela which lies south of the Orinoco, viz. the State of Bolívar, a region generally regarded as unpromising in oil prospects, because of its older mineral formations.

So far as topography is concerned, the divisions termed Bolívar, British, Dutch, and French Guianas are as artificial as they are politically. A line imagined to run from the mining district of Southeastern Venezuela, situated eighty miles or more due south of Ciudad Bolívar, to the coast of French Guiana marks roughly the beginning of the mineral region right across the Guianas.

It is only the sandy coastal belt of more recent origin in British and Dutch Guiana that claims petrological attention, which, however, lacks superficial formations to guide investigation. Reconnaissances made by geologists sent from Maracaibo's leading oil companies within the last few years have resulted in indefinite reports and a failure to arouse the active interest of these companies in Guiana prospects.

The Guiana coastal belt has, however, for many years shown traces of the presence of petroleum, which, though not out of the ordinary, have been sufficient to excite local expectations. Seeps have been recorded for many years in various parts of this district. Last year interest in such casual phenomena came to a head when traces of oil were reported during the driving of artesian wells for the British Guiana Government, in the northeastern part of the country, near the Corentyne River, at about the same time that prospectors claimed to have struck oil at depths varying from 27 to 35 feet in Northwestern Dutch Guiana, about three miles from the same river.

Coincidence and contiguity plead a strong case with believers in Guiana's oil possibilities. In Dutch Guiana a Dutch promoter secured concessions on the area in question, and formed a developing company in Holland, whence drilling equipment and drillers were despatched in June, 1929, to the wildcatting site at Pln. Waterloo on the Nickerie River. Though held up by various vicissitudes, including the death of one of the backers and changes in the organization and constituency of the company, drilling, nevertheless, has been carried on to depths reported to be below 600 feet, without findings of note yet being encountered. Possibilities are not yet exhausted.

The proceedings in British Guiana have been different, the most significant findings having been made by water drillers who were not prepared to cope with extraneous findings. According to logs kept by the engineers, gas, pitch, lignite, marine fossils, and a narrow streak of oil sand were encountered. The deepest of these wells is at Pln. Skeldon, where oil sands are said to have been met with at a depth of 1627 feet, at which point authorities ordered the well to be capped because of its nearness to a village, and sugar plant, where danger from fire was feared in case of a gusher. Two years previously gas from a 1000 ft. well blew away the rig, ignited and burned with a huge flame.

Lack of cores or other adequate records, however, have hindered geological investigation. There was at no time a flow of oil at Skeldon. Simple chloroform tests were applied to sands suspected of petroleum content. The total weight of oil recovered from samples was 8½ grams from about 16 pounds of mud and sand, which was too little from which to derive much information, except that the oil had a specific gravity of 0.934, and was of an asphalt base.

Complete Mexican Production Figures

Returns From All Producing Fields During 1929 and Productions of Individual Companies. Exports and Imports of Petroleum Products · ***By Douglas Grahame***

FROM the year 1901 until May 31, last, Mexico produced 250,711,036 cubic meters (1,577,038,412 bbl.) of petroleum with a commercial value of 2,856,315,761 pesos (about $1,428,157,880), announces the Treasury Department in an official statement. Revenue from gasoline production, and consumption levies, during the first six months of the present year amounted to 6,002,352.24 pesos (about $3,001,176) according to an announcement by the Treasury Department. June with a yield of 1,170,194 pesos was the best month, and January with 1,154,-395.36 pesos was the next best.

With a total production of only 44,687,-879 bbl. (7,104,591 cubic meters) last year, the petroleum situation in Mexico appeared rather gloomy, inasmuch as 1929 was the worst twelve months, in point of production since 1916 when the output was a mere 40,545,712 bbl. (6,-445,957 c. m.) and far below that of Mexico's peak oil year, 1921, when the production amounted to 193,397,587 bbl. (30,746,834 c. m.). A complete statistical picture of Mexico's petroleum situation last year is given by official figures of the department of petroleum of the Ministry of Industry, Commerce and Labor. The variations of petroleum production in this country since 1901 are shown in the following official table:

Year	Cub. Mts.	Bbl.	Com. Vle (Mex. Pesos)
1901	1,643	10,345	2,069
1902	6,388	40,200	8,040
1903	11,977	75,375	15,075
1904	19,962	125,625	25,125
1905	39,924	251,250	50,250
1906	79,847	502,500	100,300
1907	159,694	1,005,000	201,000
1908	624,968	3,932,900	786,580
1909	431,175	2,713,500	542,700
1910	577,455	3,634,080	726,816
1911	1,994,640	12,552,798	2,510,559
1912	2,631,100	16,558,215	4,139,554
1913	4,083,141	25,696,291	7,708,887
1914	4,168,805	26,235,403	7,870,621
1915	5,229,480	32,910,508	13,164,203
1916	6,445,957	40,545,712	22,300,141
1917	8,790,583	55,292,770	46,998,854
1918	10,147,587	63,828,326	89,655,859
1919	13,843,077	87,072,954	159,036,282
1920	24,971,173	157,068,678	314,137,356
1921	30,746,834	193,397,587	365,873,635
1922	28,979,087	182,278,457	351,674,938
1923	23,781,376	149,584,856	285,920,299
1924	22,206,406	139,678,294	272,084,563
1925	18,364,817	115,514,700	299,268,632
1926	14,375,353	90,420,973	225,122,242
1927	10,194,140	64,121,142	157,544,246
1928	7,973,070	50,150,610	101,945,631
1929	7,104,591	44,687,879	92,025,441
Totals	247,984,250	1,559,886,928	2,821,439,898

Details of Mexico's production in 1929 are given in the following official tables:

By Month (Heavy Crude)

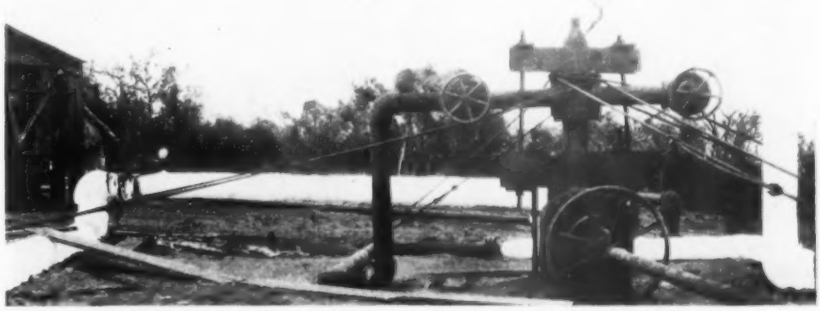
Month	Cub. Mts.	Bbl.	Mex. Pesos
Jan.	285,769	1,797,487	4,135,077
Feb.	253,076	1,591,848	3,662,010
March	288,951	1,817,502	4,181,121
April	289,850	1,823,157	4,194,129
May	275,189	1,730,939	3,981,985
June	266,475	1,676,128	3,855,893
July	285,002	1,792,663	4,123,979
Aug.	292,870	1,842,152	4,237,829
Sept.	267,337	1,681,550	3,868,366
Oct.	245,166	1,542,094	3,547,552
Nov.	228,611	1,437,963	3,308,001
Dec.	235,324	1,480,188	3,405,138
Totals	3,213,620	20,213,671	46,501,080

(Light Crude)

Jan.	273,040	1,717,422	3,194,568
Feb.	244,582	1,538,421	2,861,609
March	271,644	1,708,641	3,178,235
April	267,445	1,682,229	3,129,107
May	301,026	1,893,453	3,522,004
June	313,561	1,972,299	3,668,664
July	336,198	2,114,685	3,933,517
Aug.	357,342	2,247,681	4,180,901
Sept.	359,552	2,261,582	4,206,758
Oct.	393,150	2,472,914	4,599,855
Nov.	384,648	2,419,436	4,500,382
Dec.	388,783	2,445,445	4,548,761
Totals	3,890,971	24,474,208	45,524,361

By Zones and Months (Heavy Crude)

Zone	Month	Cub. Mts.	Month	Cub. Mts.
Altamira	Jan.	3,591	July	3,548
	Feb.	3,254	Aug.	3,521
	March	3,604	Sept.	3,442
	April	3,477	Oct.	3,472
	May	3,582	Nov.	3,258
	June	3,553	Dec.	3,333
				41,635
				cub. mts. (261,884 bbl.)
Ebano	Jan.	88,524	July	79,777
	Feb.	61,959	Aug.	87,257
	March	66,985	Sept.	75,331
	April	74,279	Oct.	58,071
	May	769,307	Nov.	51,635
	June	67,639	Dec.	53,722
				814,486
				cub. mts. (5,123,117 bbl.)
El Limon	Jan.	7,368	July	8,632
	Feb.	6,825	Aug.	7,902
	March	8,371	Sept.	7,775
	April	8,550	Oct.	7,987
	May	9,116	Nov.	7,121
	June	7,754	Dec.	5,143
				92,544
				cub. mts. (582,102 bbl.)
Cacalilao	Jan.	111,039	July	105,295
	Feb.	99,933	Aug.	106,316
	March	111,833	Sept.	95,875
	April	110,385	Oct.	95,002
	May	105,474	Nov.	90,043
	June	103,615	Dec.	93,923
				1,228,733
				cub. mts. (7,728,731 bbl.)
Banuco	Jan.	81,446	July	75,362
	Feb.	68,812	Aug.	75,938
	March	84,528	Sept.	74,106
	April	80,334	Oct.	69,920
	May	76,331	Nov.	65,802
	June	72,900	Dec.	68,744
				894,223
				cub. mts. (5,624,663 bbl.)
Topila	Jan.	11,988	July	11,937
	Feb.	10,598	Aug.	11,442
	March	11,702	Sept.	10,347
	April	11,123	Oct.	10,249
	May	10,907	Nov.	10,114
	June	10,624	Dec.	9,532
				130,583
				cub. mts. (821,367 bbl.)
San Jeronimo	Jan.	1,813	July	431
	Feb.	1,695	Aug.	494
	March	1,928	Sept.	461
	April	1,702	Oct.	465
	May	472	Nov.	638
	June	390	Dec.	927
				11,416
				cub. mts. (71,807 bbl.)
	(Light Crude)			
Dos Bocas	Jan.	283	July	284
	Feb.	255	Aug.	281
	March	282	Sept.	272
	April	272	Oct.	282
	May	281	Nov.	364
	June	272	Dec.	288
				3,416
				cub. mts. (21,487 bbl.)
Chiconcillo y San Miguel	Jan.	1,098	July	1,516
	Feb.	1,297	Aug.	1,525
	March	1,542	Sept.	1,477
	April	1,382	Oct.	1,649
	May	1,462	Nov.	1,464
	June	1,331	Dec.	1,462
				17,208
				cub. mts. (108,238 bbl.)
Tepetate-Chinampa-Amatlan-Zacamixtle	Jan.	77,695	July	80,292
	Feb.	69,205	Aug.	78,181
	March	75,584	Sept.	74,532
	April	74,799	Oct.	75,827
	May	80,931	Nov.	70,622
	June	77,925	Dec.	70,765
				906,358
				cub. mts. (5,700,992 bbl.)
Toteco-Cerro Azul	Jan.	68,639	July	75,261
	Feb.	62,970	Aug.	77,980
	March	68,360	Sept.	76,977
	April	65,975	Oct.	79,207
	May	67,629	Nov.	75,468
	June	68,931	Dec.	77,989
				865,346
				cub. mts. (5,443,026 bbl.)



National Oil Co.'s well "Imperial 7" in the Quiebrahacha field, Mexico. Note ice caused by expansion of very high-pressure gases.

Tangijo	(No production until June)			
	June	79	Oct.	370
	July	234	Nov.	313
	Aug.	2,517	Dec.	324
	Sept.	216		
				4,053
				cub. mts. (25,493 bbl.)
Tierra Amarilla	Jan.	637	July	657
	Feb.	598	Aug.	683
	March	620	Sept.	665
	April	608	Oct.	672
	May	671	Nov.	637
	June	672	Dec.	628
				7,748
				cub. mts. (48,735 bbl.)
Alazan	Jan.	3,032	July	2,990
	Feb.	2,720	Aug.	2,982
	March	3,048	Sept.	2,896
	April	3,010	Oct.	2,993
	May	3,077	Nov.	2,861
	June	2,940	Dec.	3,002
				35,551
				cub. mts. (223,616 bbl.)
Potrero del Llano	Jan.	5,354	July	6,010
	Feb.	5,043	Aug.	6,013
	March	5,587	Sept.	6,322
	April	5,523	Oct.	7,666
	May	5,928	Nov.	9,323
	June	5,700	Dec.	7,918
				76,387
				cub. mts. (480,474 bbl.)
Cerro Viejo	Jan.	8,156	July	8,043
	Feb.	7,767	Aug.	7,995
	March	8,095	Sept.	7,634
	April	7,798	Oct.	7,935
	May	8,271	Nov.	7,842
	June	8,117	Dec.	8,770
				96,423
				cub. mts. (606,501 bbl.)
Tierra Blanca-Chapapote-Alamo	Jan.	26,470	July	17,008
	Feb.	23,130	Aug.	17,021
	March	24,681	Sept.	15,961
	April	22,935	Oct.	16,176
	May	22,282	Nov.	15,594
	June	18,057	Dec.	16,905
				236,220
				cub. mts. (1,485,824 bbl.)
Jardin-Paso Real	Jan.	28,810	July	18,969
	Feb.	19,182	Aug.	22,836
	March	14,199	Sept.	23,984
	April	12,897	Oct.	30,252
	May	12,402	Nov.	29,719
	June	11,265	Dec.	32,205
				256,720
				cub. mts. (1,614,769 bbl.)
San Isidro	Jan.	1,567	July	5,799
	Feb.	1,294	Aug.	5,192
	March	1,379	Sept.	4,864
	April	1,293	Oct.	2,323
	May	1,452	Nov.	983
	June	6,065	Dec.	899
				33,110
				cub. mts. (208,262 bbl.)
Mecatepec	Jan.	2,875	July	3,041
	Feb.	1,812	Aug.	2,783
	March	1,610	Sept.	1,581
	April		Oct.	2,383
	May		Nov.	1,159
	June	779	Dec.	2,536
				20,559
				cub. mts. (129,316 bbl.)
Furbero	Jan.	1,573	July	1,595
	Feb.	1,431	Aug.	1,393
	March	1,546	Sept.	1,527
	April	1,400	Oct.	1,545
	May	1,434	Nov.	1,442
	June	1,554	Dec.	1,506
				18,146
				cub. mts. (114,138 bbl.)
Tonala	Jan.	13,106	July	82,856
	Feb.	20,166	Aug.	100,219
	March	28,583	Sept.	113,474
	April	34,167	Oct.	136,078
	May	58,158	Nov.	140,204
	June	75,924	Dec.	136,924
				939,859
				cub. mts. (5,911,713 bbl.)
Teapa	Jan.		July	274
	Feb.	2,385	Aug.	
	March	1,744	Sept.	
	April	513	Oct.	
	May	29	Nov.	
	June		Dec.	
				4,945
				cub. mts. (31,104 bbl.)
Filisola	Jan.	33,426	July	31,078
	Feb.	24,987	Aug.	29,264
	March	34,337	Sept.	26,758
	April	34,565	Oct.	27,407
	May	36,794	Nov.	26,353
	June	33,564	Dec.	26,348
				364,881
				cub. mts. (2,295,102 bbl.)
Tecuanapa	Jan.	299	July	273
	Feb.	325	Aug.	303
	March	431	Sept.	399
	April	296	Oct.	374
	May	212	Nov.	289
	June	372	Dec.	302
				3,875
				cub. mts. (24,374 bbls.)
Sarlat	Jan.	1	July	1
	Feb.	1	Aug.	1
	March	1	Sept.	1
	April	1	Oct.	1
	May	1	Nov.	1
	June	1	Dec.	1
				12
				cub. mts. (75 bbls.)
Belem	Jan.	19	July	14
	Feb.	14	Aug.	13
	March	15	Sept.	12
	April	11	Oct.	10
	May	12	Nov.	10
	June	13	Dec.	11
				154
				cub. mts. (969 bbl.)

The Mexican Eagle Oil Co., subsidiary of Royal Dutch Shell, led the 92 companies and individuals producing petroleum in Mexico last year. The 1929 production by company was as follows:

(Light Crude)

Company	Cub. Mts.	Bbl.	Totals—light, heavy bbl.
Mex. Eagle	1,857,610	11,684,367	11,810,664
Agwi Pet. Co.	99,339	624,842	653,806
Atlantica Mex. Co.	56,745	356,927	356,927
Aztlan Invers. Co.	2,755	17,330	30,482
Capuchinas Oil Co.	26,992	169,777	191,516
Continental Mex. Pet.	1,575	9,893	9,893
Holland Corona Co.	35,631	224,120	1,653,119
Cortez Aguada Pet. Corp.	4,045	25,444	25,444
Craig & Barbour	1,200	7,548	7,548
Cosmos Mex. Pet.	13,803	86,821	127,662
Farrow, H. A.	4,053	25,494	25,494
Pet. Finance Co.	3,625	22,800	59,604
Gonzalez & Meriwether	27,150	170,775	170,775
Hispano Cubano Pet. Co.	7,810	49,126	49,126
Hausteca Pet. Co.	622,308	3,914,318	3,917,771
International Pet. Co.	96,692	608,193	1,972,839
Pet. Invers. Co.	7,125	44,816	44,816
Mex. Atlas Pet. Co.	16,018	100,753	436,966
Mex. Gulf Oil Co.	252,146	1,585,998	2,128,811
Mex. Sinclair Pet. Co.	44,425	279,432	699,951
Mex. Combustible Co.	8,085	50,854	112,521
Northern Pet. Co.	5,584	35,124	35,124
Otontepec Pet. Co.	1,456	9,159	9,159
Pelaez, Ignacio	7,544	47,453	47,453
Penn Mex. Fuel Co.	327,334	2,058,930	2,324,204
Piper, R. G.	1,237	7,781	7,781
Rivers, Theo.	4,577	28,790	28,790
Schlaet Carl	1,044	6,566	50,094
Tamiahua Pet. Co.	30,129	189,512	189,512
Tampico Amatlan Co.	1,060	6,667	6,667
Tantuan Pet. Co.	10,660	67,050	67,050
The Texas Co. of Mex.	14,263	89,714	290,705
Transcontinental Pet.	111,103	698,837	2,313,544
Tuxpan Pet. Co.	165,606	1,041,662	1,041,662
Venable, H. G.	2,501	15,731	17,643
Vincent, M. L.	17,743	111,604	111,604

(Heavy Crude)

Company	Cub. Mts.	Bbl.
Mexican Eagle	20,079	126,297
Agwi Pet. Co.	4,605	28,964
Amer. Int. Fuel & Pet.	38,197	240,259
Aztlan Inver. Co.	2,091	13,152
Azuara, Esteban	9,863	62,038
Barrios Gomez Domingo	13,453	84,619
Bragdon, R. M. & Co.	916	5,760
Bravo Drilling Co.	666	4,190
Capuchinas Oil Co.	3,456	21,739
Carpenter & Caley Co.	84	528
Cochran, R. B., Co.	7,221	45,420
Admin. Cont. Nat. Pet.	98,352	618,635
Holland Corona Co.	227,186	1,428,999
Mex. Cosmos Pet. Co.	6,493	40,841
Drillers Percent. Assn.	1,384	8,705
English Oil Co.	2,615	16,449
Etienne Succs. de Pedro	1,896	11,927
Explot. Nat. Nat. Recs.	681	4,283
Pet. Finance Co.	5,851	36,804
France Mex. Pet. Co.	14,911	93,792
Frnch. Span. Pet. Co.	92,544	582,103
Guilliam, J. L. Co.	324	2,039
Globe Pet. Co.	15,968	100,439
Gris, Carlos M.	2,959	18,613
Guaranty Oil Min. Assn.	2,148	13,510
Gulf Coast Corp.	252,411	1,587,665
Guzman, Manuel E.	9,552	60,082
Head Martin Co.	3,753	23,606
Hausteca Pet. Co.	549	3,453
Imp. Mex. Oil Prods. Co.	101,493	638,391
Internat. Pet. Pur. Co.	2,807	17,657
Internat. Pet. Co.	216,955	1,364,646
Intermex. Pet. Co.	276	1,736
Itamex Oil Co.	7,682	48,320
Jonker P. J. Co.	90,112	566,805
Kern Mex. Oilfields	17,577	110,559
Maza, Francis y Luz.	2,691	16,926
Mex. Atlas Pet. Co.	53,452	336,213
Mex. Crude Oil Co.	14,605	91,865
Mex. Gulf Oil Co.	86,298	542,813
Mex. Oil Co.	1,811	11,391
Mex. Sinclair Pet. Corp.	66,855	420,519
Mex. Combustible Co.	9,804	61,667
Mex. Pet. Co.	810,334	5,096,998
Mex. Nat. Pet. Co.	1,092	6,868
Nat. Co. Pet. Explt.	2,254	14,179
Meza, M. T.	10,572	66,499
Minerva Pet. Co.	50,743	319,175
The Nat. Oil Co.	13,749	86,480
New England Fuel Oil	37,810	237,824
Nienau, Wm. Pt. Co.	269	1,691
Panuco Boston Oil Co.	13,602	85,557
Penn Mex. Fuel Co.	42,174	265,274
Perez y Rivera	3,344	21,033
Richmex Pet. Co.	1,572	9,887
Sanchez, Rodolfo	3,737	23,504
Schlaet Carl Co.	6,920	43,528
Mex. El Sol Pet. Co.	23,033	144,878
Sou. Fuel & Refin. Co.	254,451	1,600,497
Standard Drilling Co.	2,470	15,537
Tampascas Oil Co. Mex.	5,838	36,721
Tampico Panuco Pet. Co.	79	497
Territorial Pet. Co.	3,541	22,273
The Texas Co. of Mex.	31,954	200,990
Tillotson A. R. Co.	1,328	8,355
Thomas & Co.	4,151	26,110
Transcontinental Pet.	256,710	1,614,707
Ulises Pet. Co.	52,282	328,853
Unida Pet. Co.	36,715	230,939
Venable, H. G.	304	1,912
Veracruz Mex. Pet. Co.	24,031	151,154
Von Phul Nolan Co.	4,197	26,400
Wiegand F. Co.	1,187	7,467
Williamson, D. A.	551	3,465

One hundred and fourteen producing wells were brought in in Mexico last year. They are:

Zone	No. of wells	In dly. prod. c.mts.	In dly. prod. bbl.	Avge. dly. prod. c.mts.	Avge. dly. prod. bbl.
Ebano	1	48	302	48	302
Cacalilao	15	1,722	10,831	115	723
Panuco	15	1,314	8,265	88	554
Topila	6	271	1,705	45	283
Cincuenta	3	52	327	17	107
San Sebastian	1	10	63	10	63
Amatlan	1	6	38	6	38
Potrero del Llano	2	151	950	76	478
Alamo	4	271	1,704	68	428
Jardin-Paso Real	7	5,328	33,513	761	4,787
San Isidro	2	256	1,610	128	805
Furbero	1	12	75	12	75
Teapa	7	261	1,642	37	233
Tonala	37	7,750	48,748	209	1,315
Filisola	12	224	1,409	19	120
Totals	114	17,676	111,182	155	975

By Months

January	8	1,211	7,617	151	950
February	15	743	4,673	50	315
March	4	319	2,006	80	503
April	13	970	6,101	75	472
May	10	1,201	7,554	120	755
June	13	1,690	10,630	130	818
July	9	3,476	21,864	386	2,428
August	12	1,812	11,398	151	950
September	5	1,347	8,473	269	1,692
October	6	1,392	8,756	232	1,459
November	12	2,144	13,484	179	1,126
December	7	1,371	8,624	196	1,233

Mexico exported 26,601,775 bbl. of crude petroleum and its by-products last year. Tampico, with shipments of 3,629,501 cubic meters (22,829,560 bbl.) was the leading exporting port. Other export ports were: Puerto Mexico 534,616 c. m. (3,362,737 bbl.); Tuxpan, 28,814 c. m. (181,241 bbl); other ports, 36,286 c. m. (288,237 bbl.).

Exportations by Month

Month	Cub. mts.	Bbl.	Tons
January	301,324	1,895,327	283,137
February	201,265	1,265,957	190,553
March	358,990	2,258,048	339,065
April	341,858	2,150,288	328,098
May	462,090	2,906,546	435,691
June	470,795	2,961,300	453,247
July	394,821	2,483,424	376,797
August	386,585	2,431,620	365,627
September	455,422	2,864,604	430,322
October	297,712	1,872,608	284,503
November	291,978	1,836,542	269,516
December	266,377	1,675,511	250,963

Importations of petroleum and its by-products last year amounted to 69,610 cubic meters (437,847 bbl., or 63,728 tons).